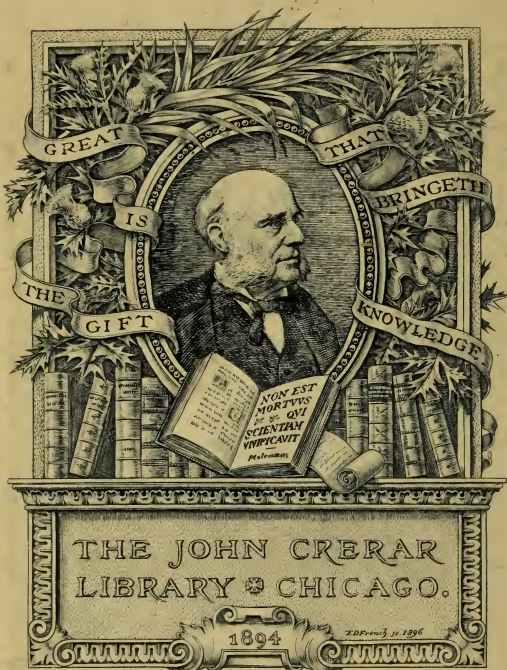




PRESENTED BY

University





Union College Bulletin

University Catalogue Number
1911-1912

Vol. V No. 1

November 1911

PUBLISHED QUARTERLY BY UNION COLLEGE
SCHENECTADY, NEW YORK

In November, February, May and August

Admitted to the mail as second-class matter

1
2
3
4
5
6
7
8
9
10
11

12
13
14

15
16
17
18
19
20
21
22
23
24
25
26
27
28

29
30

31
32
33

34
35
36

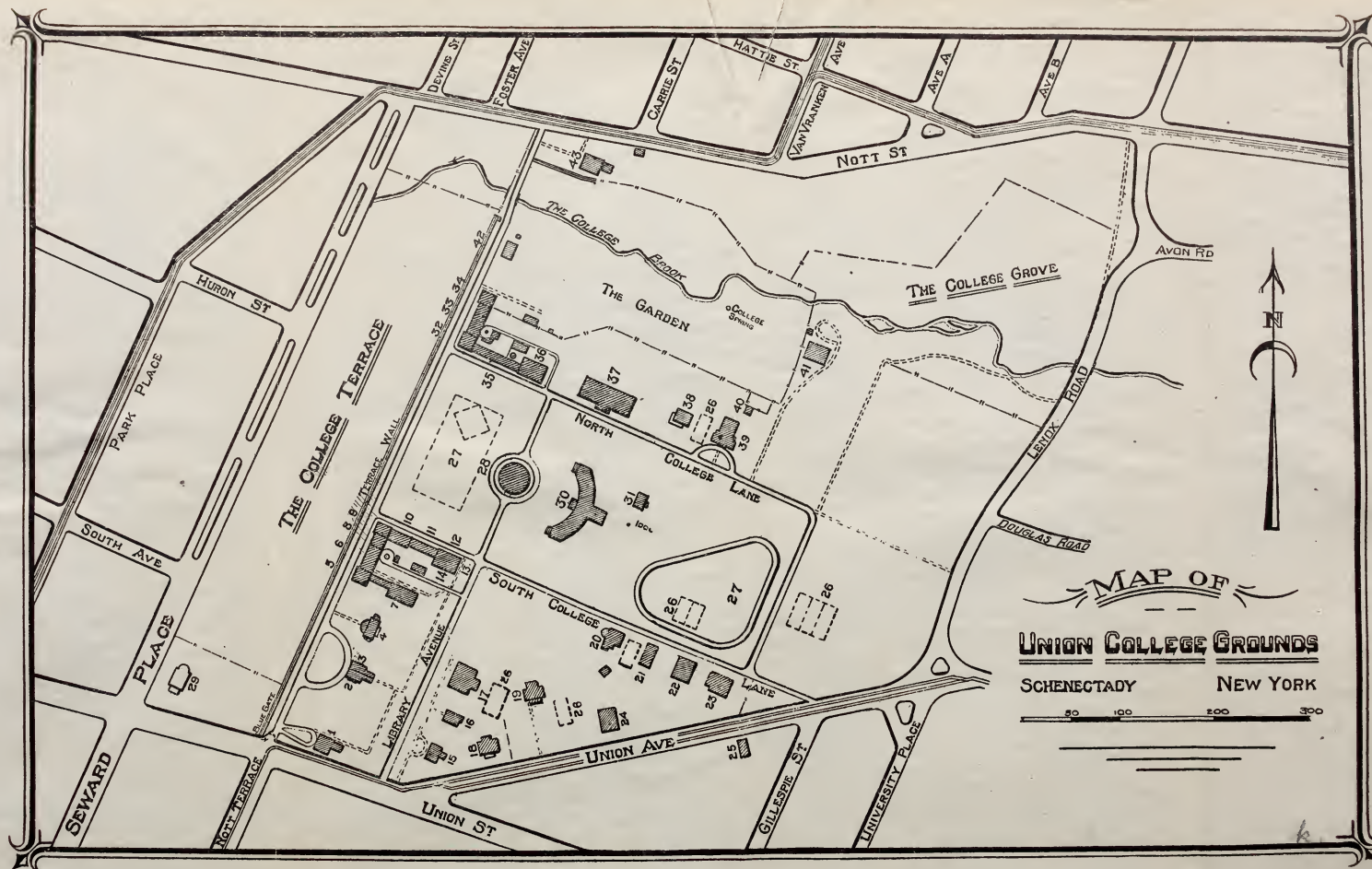
37
38
39
40
41
42
43



THE
JOHN CRERAR
LIBRARY

INDEX

- 1 President's House
- 2 Prof. Hoffman
- 3 Prof. Barnes
- 4 Silliman Hall (Y M C A)
- 5 Prof. Ellery
- 6 South College Dormitory
- 7 Gymnasium
- 8 $\Phi \Delta \Theta$ House
- 9 Prof. Stoller
- 10 Prof. Hale
- 11 President's Office
- Classrooms
- 12 Chapel
- 13 Dean's Office
- 14 Treasurer's Office
- 15 Biological Laboratory
- (second story)
- 15 $\Sigma \Phi$ Place
- 16 Ashmore House
- 17 $\Delta \Delta \Phi$ House
- 18 Wells House
- 19 $X \Psi$ Lodge
- 20 ΨT House
- 21 Ass't Treas. Dewey
- 22 ΔT House
- 23 $\Phi T \Delta$ House
- 24 $B \Theta \Pi$ House
- 25 Dean Ripton
- 26 Tennis Courts
- 27 Athletic Field
- 28 Nott Memorial Hall
- (College Library)
- 29 Carnegie (Public) Library
- 30 Washburn Hall
- Class rooms and offices
- Secretary's Office
- 31 Central Heating Plant
- 32 Prof. Bennett
- 33 North College Dormitory
- Pyramid Club
- $\Theta \Delta \Phi$ Fraternity
- 34 Prof. McKean
- 35 Chemical Laboratory
- 36 Physics Laboratory
- (second story)
- 37 General Eng'g Building
- 38 K A Lodge
- 39 Electrical Eng'g Lab.
- 40 Caretaker's House
- 41 Barn
- 42 Benedict House
- 43 Prof. Landreth



ANNUAL CATALOGUE
OF
UNION UNIVERSITY



1911-1912

PRESS OF
FRANK H. EVORY & Co.
ALBANY, N. Y.

frp

C

Un 32u H
1911/12-1913/14

CONTENTS

	PAGE
Map	<i>Frontispiece</i>
Union University	7
University Calendar	8
Officers of the University	9
University Faculty	10
Union College	19
Union College Calendar	21
Trustees of Union College	22
Officers of the Board of Trustees	23
Faculty of Union College	24
Standing Committees of the Faculty	26
College Officers	27
Courses of Study	28
Admission	30
Entrance by Certificate	31
Requirements	31
Entrance Examinations	41
Departments of Instruction	43
Curricula of Academic Courses	71
Schedule of Required Academic Studies	83
Schedule of Elective Studies	85
Engineering School	88
Engineering Faculty	90
General Description	92
General Engineering Department	99
Sanitary Engineering Department	10

378.747
Un 32u H

34310
14793
Withdrawn

6

Union College— <i>Continued.</i>	PAGE
Electrical Engineering Department.....	110
Curricula of Engineering Courses.....	125
Attendance and Standing.....	140
Expenses.....	143
Scholarships.....	146
Prizes.....	151
Degrees and Honors.....	154
Degrees and Awards in 1911.....	158
Albany Medical College.....	164
Albany Law School.....	180
Dudley Observatory.....	184
Albany College of Pharmacy.....	186
Students, Union University.....	190
Summary.....	214
Index.....	215

UNION UNIVERSITY

Union University embraces the following institutions:
UNION COLLEGE, Founded 1795

Academic Department	{	Classical Course
		Latin Scientific Course
		Scientific Course
Engineering Department	{	General Engineering Course
(Founded 1845)		Sanitary Engineering Course
		Electrical Engineering Course

ALBANY MEDICAL COLLEGE, Founded 1838

ALBANY LAW SCHOOL, Founded 1851

DUDLEY OBSERVATORY, Founded 1852

ALBANY COLLEGE OF PHARMACY, Founded 1881

Union College acquired by its charter, granted in 1795, full university powers, but the creation of graduate institutions at Schenectady was not found practicable. Schools of law and medicine and also an astronomical observatory have long existed at Albany, only a few miles distant. The arrangement naturally suggested by these circumstances was, that the professional schools and the observatory at Albany should be united with Union College, under the charter and board of trustees of the latter. This was accordingly effected by the incorporation of Union University in 1873. The Albany College of Pharmacy was created by the board of governors on June 21, 1881, and incorporated as a department of the university on August 21 of the same year.

The president of Union College and permanent chancellor of Union University has the oversight of the university, each of the institutions having its resident dean. The dean of Union College acts in the place of the president in his absence and also assists him in matters delegated to him by the president. The university board of governors is composed of permanent trustees of Union College and of representatives of each of the other institutions embraced in Union University.

1911—UNIVERSITY CALENDAR—1912

1911

Fall term of Union College begins.....Monday, September 18
 First semester of Law School begins.....Tuesday, September 19
 Winter term of Medical College begins..Tuesday, September 19
 Winter term of College of Pharmacy begins..Monday, October 2
 Election day—recess.....Tuesday, November 7
 Thanksgiving day—recess.....Thursday, November 30
 Fall term of Union College ends.....Friday, December 22

Christmas recess in all departments

1912

Sessions resumed.....Tuesday-Thursday, January 2-4
 Day of prayer for colleges.....Thursday, January 25
 First semester of Law School ends.....Friday, February 2
 Second semester of Law School begins.....Monday, February 5
 Washington's birthday—recess.....Thursday, February 22
 Winter term of Union College ends.....Saturday, March 23
 Spring term of Union College begins.....Monday, March 25
 Easter recess.....Friday-Monday, April 5-8
 Commencement week, Union College

Sunday-Wednesday, June 9-12

Entrance examinations, Union College

Thursday-Friday, June 13-14

Fall term of Union College begins.....Monday, September 16
 First semester of Law School begins.....Tuesday, September 17
 Winter term of Medical College begins...Tuesday, September 17
 Winter term of College of Pharmacy begins..Monday, October 7
 Election day—recess.....Tuesday, November 5
 Thanksgiving day—recess.....Thursday, November 28
 Fall term of Union College ends.....Saturday, December 21

For calendars of departments, see Pages 21, 171, 182, 187

OFFICERS OF THE UNIVERSITY

Chancellor

REV. CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Honorary Chancellor, 1911

RT. HON. JAMES BRYCE, LL. D.

Board of Governors

President, SIMON W. ROSENDALE, LL. D., Albany

Secretary, J. NEWTON FIERO, LL. D., Albany

Union College

SILAS B. BROWNELL, LL. D.....	New York City
EDWARD WINSLOW PAIGE, LL. D.....	New York City
GEORGE ALEXANDER, D. D.....	New York City
WARNER MILLER, LL. D.....	Herkimer
NICHOLAS V. V. FRANCHOT, A. M.....	Olean
EDWIN W. RICE, JR., PH. D., SC. D.....	Schenectady
EDWARD P. WHITE, A. M.....	Buffalo
ALONZO P. STRONG, A. B.	Schenectady
EDGAR S. BARNEY, SC. D.....	New York City
WILLIAM F. HAVEMEYER.....	New York City
FRANKLIN H. GIDDINGS, LL. D.....	New York City

Albany Medical College

SIMON W. ROSENDALE, LL. D.....	Albany
ALDEN CHESTER	Albany

Albany Law School

AMASA J. PARKER, LL. D.....	Albany
J. NEWTON FIERO, LL. D.....	Albany

Dudley Observatory

SAMUEL B. WARD, M. D., PH. D.....	Albany
BENJAMIN WALWORTH ARNOLD.....	Albany

Albany College of Pharmacy

WILLIS G. TUCKER, M. D., PH. D.....	Albany
CHARLES NEWMAN	Albany

UNIVERSITY FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Chancellor

BENJAMIN H. RIPTON, PH. D., LL. D.

Dean of Union College and Professor of History and Government

SAMUEL B. WARD, M. D., PH. D.

Dean of the Medical College and Professor of Theory and Practice of Medicine

J. NEWTON FIERO, LL. D.

Dean of the Law School and Professor of Procedure, Equity, Torts and Evidence

LEWIS BOSS, A. M., LL. D.

Director of the Dudley Observatory

WILLIS G. TUCKER, M. D., PH. D.

Dean of the College of Pharmacy, Registrar of the Medical College, and Professor of Chemistry and Toxicology

ALBERT VANDER VEER, M. D., PH. D., LL. D.

Professor of Surgery

JOHN M. BIGELOW, M. D., PH. D.

Professor Emeritus of Materia Medica, Therapeutics and Diseases of the Throat and Nose

JAMES P. BOYD, M. D.

Professor of Obstetrics and Diseases of Children

WILLIAM HAILES, M. D.

Anthony Professor Emeritus of Pathological Anatomy, Histology, and Fractures and Dislocations

CYRUS S. MERRILL, M. D.

Professor of Ophthalmology and Otology

FREDERIC C. CURTIS, M. D.

Professor of Dermatology

ALFRED B. HUESTED, M. D., PH. G.

Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.
Professor Emeritus of Pharmacy

HENRY HUN, M. D.
Professor of Diseases of the Nervous System

SAMUEL R. MORROW, M. D.
Professor of Practice of Surgery and of Orthopedic Surgery

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

OLIN H. LANDRETH, A. M., C. E., Sc. D.
Professor of Civil Engineering

HERMAN C. GORDINIER, M. D.
Professor of Physiology

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

LEWIS R. PARKER
Professor of the Law of Bailments, Bills and Notes, Guarantee
and Suretyship, and Constitutional Law

HOWARD VAN RENSSELAER, M. D.
Professor of Materia Medica and Therapeutics, and Adjunct
Professor of Theory and Practice of Medicine

JOSEPH D. CRAIG, M. D.
Professor of Anatomy, and Curator of the Museum

FLETCHER W. BATTERSHALL
Professor of Elementary Law and Domestic Relations

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

JOHN I. BENNETT, A. B.
Professor of the Greek Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D.
Professor of Chemistry

FRANK WHITE
Professor of the Law of Corporations

GEORGE LAWYER
Professor of the Law of Contracts, Personal Property and Sales,
and Bankruptcy

FRANK B. GILBERT
Professor of the Law of Real Property, Legislation and Statutory
Construction

FRANK C. BARNES, A. M., PH. D.
Professor of Modern Languages

HORACE G. McKEAN, A. M.
Professor of Rhetoric and Public Speaking

ANDREW MacFARLANE, M. D.
Professor of Physical Diagnosis and Medical Jurisprudence

ARTHUR G. ROOT, M. D.
Professor of Diseases of the Throat and Nose

LEO NEUMAN, M. D.
Professor of Gastro-Enteric Diseases, and Clinical Professor of
the Theory and Practice of Medicine

JACOB C. E. SCOTT
Professor of Criminal Law

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.
Professor of Mathematics

JAMES B. KENNEDY, PH. D.
Professor of Economics and Sociology

THOMAS ORDWAY, M. D.
Professor of Pathology and Bacteriology

GEORGE DWIGHT KELLOGG, PH. D.
Professor of the Latin Language and Literature

ARTHUR W. ELTING, M. D.

Professor of the Practice of Surgery and of Clinical Surgery

EDGAR A. VANDER VEER, M. D.

Professor of Abdominal and Clinical Surgery

JOHN A. SAMPSON, M. D.

Professor of Gynecology

FREDERICK W. CAMERON

Professor of the Law of Patents, Copyright, and Trade Marks

CHARLES J. HERRICK

Professor of Civil Law, International Law, and Conflict of Laws

HON. ALTON B. PARKER, LL. D.

Lecturer on Development of the Law

HON. IRVING G. VANN, LL. D.

Lecturer on the Law of Insurance

HON. WILLIAM E. WERNER

Lecturer on Constitutional Law

HON. ALDEN CHESTER

Lecturer on the Federal Judicial System

FREDERICK D. COLSON

Lecturer on Books and Their Uses

HUGO MUENSTERBERG, PH. D., M. D., LL. D., LITT. D.

Ichabod Spencer Lecturer on Psychology

JOHN L. MARCH, A. M., PH. D.

Adjunct Professor of Modern Languages

SPENCER L. DAWES, M. D.

Adjunct Professor of Materia Medica, and Director of
Microscopical Laboratory

THEODORE J. BRADLEY, B. S., PH. G.

Adjunct Professor of Inorganic Chemistry and Mathematics

GARRET VANDER VEER DILLENBACK, PH. G.

Associate Professor of Pharmacy

OLIN J. FERGUSON, M. E. E.
Associate Professor of Electrical Engineering

HERMAN BENDELL, M. D.
Clinical Professor of Otology

JESSE M. MOSHER, M. D.
Clinical Professor of Insanity, Neurology and Electro-
Therapeutics

HARRY J. LIPES, M. D.
Clinical Professor of Obstetrics

ARTHUR SAUTTER, M. D.
Clinical Professor of Dermatology and Lecturer on Venereal
Diseases

GEORGE E. LOCHNER, M. D.
Clinical Professor of Gynecology

CLEMENT F. THEISEN, M. D.
Clinical Professor of Diseases of the Throat and Nose

HENRY L. K. SHAW, M. D.
Clinical Professor of Diseases of Children

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON COLLINS STEWART, PH. D.
Assistant Professor of German

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

ARTHUR J. ROY, C. E., A. M.
Assistant in Dudley Observatory

WILLIAM O. STILLMAN, M. D.
Lecturer on the History of Medicine

CHARLES H. MOORE, M. D.
Lecturer on Ophthalmology and Otology

WILLIAM B. VARNUM, A. B.

Assistant in Dudley Observatory

JAMES F. ROONEY, M. D.

Lecturer on Hygiene and Instructor in Medicine

HOWARD E. LOMAX, M. D.

Lecturer and Demonstrator of Anatomy

GEORGE G. LEMPE, M. D.

Lecturer on Anatomy and Minor Surgery and Assistant Demonstrator of Anatomy

LA SALLE ARCHAMBAULT, M. D.

Lecturer on Neurology

ARTHUR F. HOLDING, M. D.

Lecturer on Radiography

WILLIAM A. LARKIN, M. D.

Lecturer on Inorganic Chemistry, and Instructor in Physics and Chemistry

Assistant Registrar of the Medical College

JAMES N. VANDER VEER, M. D.

Lecturer on Surgical Technic and Instructor in Genito-Urinary Surgery

ARTHUR J. BEDELL, M. D.

Lecturer on Ophthalmology

JAMES WESLEY WILTSE, M. D.

Lecturer on Dermatology and Genito-Urinary Diseases

HARRY S. BERNSTEIN, M. D.

Lecturer on Histology, Pathology and Bacteriology

JOHN H. GUTMANN, M. D.

Lecturer on Surgery and Obstetrics

JOSEPH LEWI DONHAUSER

Lecturer on Surgical Diagnosis

J. L. R. HAYDEN

Lecturer on Arc Lighting and Photometry, and Supervisor of Electrical Engineering Thesis Work

ALVAH H. TRAVER, M. D.

Instructor in Surgery

EDGAR R. STILLMAN, M. D.

Instructor in Physiology

EDWIN C. HUTMAN, PH. G.

Director of Pharmaceutical Laboratory

CHARLES K. WINNE, JR., M. D.

Instructor in Theory and Practice of Medicine

JOSEPH A. LANAHAN, M. D.

Instructor in Dermatology and Venereal Diseases

HARRY RAYMOND, A. B.

Assistant in Dudley Observatory

JAMES H. CUNNINGHAM, M. E. E.

Instructor in Electrical Engineering

MORLAND KING, M. E. E.

Instructor in Electrical Engineering

GEORGE E. BEILBY, M. D.

Instructor in Surgical Pathology

BRANSON K. DE VOE, M. D.

Instructor in Anatomy

EUGENE E. HINMAN, M. D.

Instructor in Diseases of the Throat and Nose

MALCOLM DOUGLAS, M. D.

Instructor in Physical Diagnosis and Therapeutics

CLINTON B. HAWN, M. D.

Instructor in Clinical Microscopy

ERASTUS CORNING, M. D.

Instructor in Theory and Practice of Medicine and Physical
Diagnosis

ALBERT S. EASTMAN, M. S.

Instructor in Chemistry

JOHN A. C. CALLAN, M. C. E.

Instructor in Engineering Drawing

LEROY S. BLATNER, D. D. S.

Instructor in Oral Pathology

WILLIAM KIRK, M. D.

Instructor in the Anatomy and Physiology of the Nervous System

WALTER A. REYNOLDS, M. D.

Prosector of Anatomy, and Assistant Curator of the Museum

JEROME MEYERS, M. B.

Instructor in Gastro-Enteric Diseases and Physical Diagnosis

JARED W. SCUDDER, A. M.

Instructor in Latin

WARREN C. TAYLOR, S. B.

Instructor in Civil Engineering

MEADE L. ZIMMER, A. M.

Assistant in Dudley Observatory

RICHARD A. LAWRENCE, M. D.

Instructor in Obstetrics

HAROLD P. SAWYER, M. D.

Instructor in Clinical Microscopy

THEOBALD F. DOESCHER, M. D.

Instructor in Physiological Chemistry and Gastro-Enteric Diseases

NELSON K. FROMM, M. D.

Instructor in Materia Medica

TIFFANY LAWYER, M. D.

Instructor in Gynecology

EDWIN L. DRAPER, M. D.

Instructor in Surgery and Surgical Pathology, and Assistant Demonstrator of Anatomy

WILLIAM G. KEENS, M. D.

Instructor in Diseases of Throat and Nose

WARREN L. BRADT, PH. G.

Lecturer on Pharmaceutical Jurisprudence

WILLIAM W. GIBSON, PH. G.
Instructor in Commercial Pharmacy

ELLIS KELLERT, M. D.
Instructor in Pathology and Bacteriology

WALTER E. LUNDBLAD, M. D.
Instructor in Pathology and Bacteriology

WALTER S. HASTINGS, A. M.
Instructor in French

STANLEY P. CHASE, PH. D.
Instructor in English

SAMUEL M. CAVERT, A. B.
Instructor in Greek

HARRY H. DRAKE, M. D.
Instructor in Anatomy

JOSEPH A. COX, M. D.
Instructor in Obstetrics

JOSEPH L. BENDELL, M. D.
Instructor in Surgery

LEROY JENKINS, A. B.
Assistant in Dudley Observatory

LEROY Z. MEARNS, C. E.
Assistant in Dudley Observatory

WILLIAM HUNT
Assistant in Dudley Observatory

THOMAS W. JENKINS, M. D.
Assistant Instructor in Histology

CHARLES W. L. HACKER, M. D.
Assistant Instructor in Pathology and Bacteriology

WARDNER D. AYER, M. D.
Assistant Instructor in Pathology and Bacteriology

WILLIAM D. ALLEN, M. D.
Assistant Instructor in Pathology and Bacteriology

UNION COLLEGE

Union College was incorporated by the Regents of the University of the State of New York on the 25th day of February, 1795. It was the second college incorporated in the state, and the first north of the city of New York and west of the Hudson river. It received its name from the circumstance that several religious denominations co-operated in its organization, and it was the first college in the United States which was not of a strictly denominational character. It has continued from its foundation to be a representative institution of Christian unity.

The first president of Union College was the Rev. John Blair Smith, of Philadelphia. He was elected in 1795, and resigned in 1799, only a few months before his death. He was succeeded by Jonathan Edwards, the younger, who died in 1801. The Rev. Jonathan Maxcy, previously president of Brown University, succeeded Dr. Edwards, resigning at the end of two years. In 1804 the Rev. Eliphalet Nott was elected president of Union College, which office he held until his death, on the 29th day of January, 1866. The Rev. Laurens P. Hickok, a graduate of the college, who had long acted as vice-president, was elected his successor. He resigned in 1868. The Rev. Charles A. Aiken succeeded Dr. Hickok in 1869, and resigned in 1871. The Rev. Eliphalet Nott Potter was elected president in 1871, and was inaugurated June 20, 1872. On his resignation, in 1884, the Hon. Judson S. Landon was appointed president *ad interim*, and served until the inauguration of Harrison E. Webster, who was elected president May 23, 1888, and inaugurated June 26, 1888. On his resignation, in January, 1894, Rev. Andrew V. V. Raymond was elected president, and was inaugurated in June, 1894. Dr. Raymond resigned July 18, 1907, and the Rev. George Alexander was appointed president *ad interim*. On January 28, 1909, Rev. Charles Alexander Richmond was elected president. Dr. Richmond was inaugurated June 7, 1909.

1911

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
Sept.	..	..	..	..	..	1	2	Nov.	..	..	..	1	2	3	4
	3	4	5	6	7	8	9		5	6	7	8	9	10	11
	10	11	12	13	14	15	16		12	13	14	15	16	17	18
	17	18	19	20	21	22	23		19	20	21	22	23	24	25
Oct.	24	25	26	27	28	29	30	Dec.	26	27	28	29	30	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	1	2	3	4	5	6	7		3	4	5	6	7	8	9
	8	9	10	11	12	13	14		10	11	12	13	14	15	16
	15	16	17	18	19	20	21		17	18	19	20	21	22	23
	22	23	24	25	26	27	28		24	25	26	27	28	29	30
	29	30	31	..	..	..	..		31	..	..	..	..	..	..

1912

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
Jan.	..	1	2	3	4	5	6	July	..	..	..	..	..	..	..
	7	8	9	10	11	12	13		..	1	2	3	4	5	6
	14	15	16	17	18	19	20		7	8	9	10	11	12	13
	21	22	23	24	25	26	27		14	15	16	17	18	19	20
Feb.	28	29	30	31	..	..	..	Aug.	21	22	23	24	25	26	27
	..	..	..	..	..	1	2		28	29	30	31	..	..	..
	..	..	..	..	..	2	3		..	..	..	..	..	..	..
	4	5	6	7	8	9	10		..	..	..	..	1	2	3
Mar.	11	12	13	14	15	16	17	Sept.	4	5	6	7	8	9	10
	18	19	20	21	22	23	24		11	12	13	14	15	16	17
	25	26	27	28	29	..	..		18	19	20	21	22	23	24
	..	..	..	..	..	..	..		25	26	27	28	29	30	31
Apr.	..	..	..	..	..	1	2	Oct.	..	..	..	..	..	..	..
	3	4	5	6	7	8	9		1	2	3	4	5	6	7
	10	11	12	13	14	15	16		8	9	10	11	12	13	14
	17	18	19	20	21	22	23		15	16	17	18	19	20	21
May	24	25	26	27	28	29	30	Nov.	22	23	24	25	26	27	28
	31	..	..	..	..	..	..		29	30	..	..	..	..	..
	..	1	2	3	4	5	6		..	..	1	2	3	4	5
	7	8	9	10	11	12	13		6	7	8	9	10	11	12
June	14	15	16	17	18	19	20	Dec.	13	14	15	16	17	18	19
	21	22	23	24	25	26	27		20	21	22	23	24	25	26
	28	29	30	..	..	..	..		27	28	29	30	31	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
July	..	..	..	1	2	3	4	Nov.	..	..	..	..	..	1	2
	5	6	7	8	9	10	11		3	4	5	6	7	8	9
	12	13	14	15	16	17	18		10	11	12	13	14	15	16
	19	20	21	22	23	24	25		17	18	19	20	21	22	23
Aug.	26	27	28	29	30	31	..	Dec.	24	25	26	27	28	29	30
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	1		..	..	..	..	..	..	..
	2	3	4	5	6	7	8		1	2	3	4	5	6	7
Sept.	9	10	11	12	13	14	15	Jan.	8	9	10	11	12	13	14
	16	17	18	19	20	21	22		15	16	17	18	19	20	21
	23	24	25	26	27	28	29		22	23	24	25	26	27	28
	30	..	..	..	..	..	..		29	30	..	..	..	..	..
Oct.	..	..	..	..	..	..	..	Feb.	..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
Nov.	..	..	..	..	..	..	..	Mar.	..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
Dec.	..	..	..	..	..	..	..	Apr.	..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..

Figures in heavy type indicate days on which Union College is in session

UNION COLLEGE CALENDAR

1911

Examinations for conditioned students...	Saturday, September 16
Registration day for freshmen.....	Monday, September 18
Entrance examinations begin.....	Tuesday, September 19
Registration of three upper classes....	Wednesday, September 20
Entrance examinations concluded.....	Wednesday, September 20
First chapel exercises and recitations....	Thursday, September 21
Senior reception to entering students.....	Friday, September 22
Election day—recess.....	Tuesday, November 7
Thanksgiving day—recess, three days....	Thursday, November 30
Allison-Foote prize debate.....	Friday, December 8
Examinations for conditioned students....	Saturday, December 9
Fall term ends.....	Friday, December 22

1912

Registration day for students, winter term...	Tuesday, January 2
Recitations begin	Wednesday, January 3
Day of prayer for colleges.....	Thursday, January 25
Washington's birthday.....	Thursday, February 22
Examinations for conditioned students.....	Saturday, March 2
Winter term ends.....	Saturday, March 23
Registration day for students, spring term....	Monday, March 25
Recitations begin	Tuesday, March 26
Easter recess.....	Friday-Monday, April 5-8
Selection of junior and sophomore orators....	Monday, April 15
Examinations for conditioned students.....	Saturday, May 4
Presentation of prize essays.....	Wednesday, May 15
Senior examinations end.....	Friday, May 24
Memorial day.....	Thursday, May 30
Spring term examinations end.....	Saturday, June 8
Baccalaureate sermon.....	Sunday, June 9
Prize oratory of juniors and sophomores.....	Monday, June 10
Meeting of trustees, societies, alumni.....	Tuesday, June 11
President's reception.....	Tuesday, June 11
Commencement, second Wednesday in June..	Wednesday, June 12
Entrance examinations.....	Thursday-Friday, June 13-14
Examinations for conditioned students...	Saturday, September 14
Fall term, 1912-1913, begins.....	Monday, September 16

TRUSTEES OF UNION COLLEGE

Ex-Officio. { HIS EXCELLENCY JOHN A. DIX, Governor
 HON. THOMAS F. CONWAY, Lieutenant-Governor
 HON. EDWARD LAZANSKY, Secretary of State
 HON. WILLIAM SOHMER, Comptroller
 HON. JOHN J. KENNEDY, Treasurer
 HON. THOMAS J. CARMODY, Attorney-General

SILAS B. BROWNELL, LL. D., 71 Wall street, New York

HON. EDWARD W. PAIGE, LL. D., 46 Cedar street, New York

REV. GEORGE ALEXANDER, D.D., 47 University place, New York

HON. WARNER MILLER, LL. D., Herkimer

HON. NICHOLAS V. V. FRANCHOT, A. M., Olean

EDWIN W. RICE, JR., PH. D., Sc. D., Schenectady

EDWARD P. WHITE, A. M., Buffalo

EDGAR S. BARNEY, Sc. D., 36 Stuyvesant street, New York

WILLIAM F. HAVEMEYER, 32 Nassau street, New York

PROF. FRANKLIN H. GIDDINGS, LL. D., 814 West End avenue, New York.

HON. ALONZO P. STRONG, A. B., Schenectady

COURTLAND V. ANABLE, A. B., 31 Nassau street, New York

WILLIS T. HANSON, Schenectady

FRANK BAILEY, ART. D., 175 Remsen street, Brooklyn

HARWOOD DUDLEY, Johnstown, term of office expiring June, 1912

FREDERICK W. CAMERON, A. M., Albany, term of office expiring June, 1913

WILLIAM PLATT ADAMS, A. B., Red Hook, term of office expiring June, 1914

CHARLES B. McMURRAY, A. M., Troy, term of office expiring June, 1915

Chairman of the Board

SILAS B. BROWNELL, LL. D.

Treasurer

FRANK BAILEY, ART. D.

Acting Secretary

EDGAR S. BARNEY, SC. D.

Finance Committee

NICHOLAS V. V. FRANCHOT, A. M.

COURTLAND V. ANABLE, A. B.

FRANK BAILEY, ART. D.

HON. SILAS B. BROWNELL, LL. D.

WILLIS T. HANSON

EDWIN W. RICE, JR., PH. D., SC. D.

HON. ALONZO P. STRONG, A. B.

Education Committee

REV. GEORGE ALEXANDER, D. D.

COURTLAND V. ANABLE, A. B.

FRANK BAILEY, ART. D.

EDGAR S. BARNEY, SC. D.

PROF. FRANKLIN H. GIDDINGS, LL. D.

WILLIAM F. HAVEMEYER

HON. EDWARD W. PAIGE, LL. D.

Committee on Plant

CHARLES B. McMURRAY, A. M.

WILLIAM P. ADAMS, A. B.

FREDERICK W. CAMERON, A. M.

HARWOOD DUDLEY, A. B.

WILLIS T. HANSON

EDWIN W. RICE, JR., PH. D., SC. D.

Committee of Resident Trustees

WILLIS T. HANSON

EDWARD W. PAIGE, LL. D.

EDWIN W. RICE, JR., PH. D., SC. D.

HON. ALONZO P. STRONG, A. B.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
Professor of History and Government

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

OLIN H. LANDRETH, A. M., C. E., Sc. D.
Professor of Civil Engineering

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

JOHN I. BENNETT, A. B.
Professor of the Greek Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Secretary
Professor of Modern Languages

HORACE GRANT MCKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. MCCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.
Professor of Mathematics

JAMES BOYD KENNEDY, PH. D.
Professor of Economics and Sociology

GEORGE DWIGHT KELLOGG, PH. D.
Professor of the Latin Language and Literature

OLIN J. FERGUSON, M. E. E.
Associate Professor of Electrical Engineering

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON COLLINS STEWART, PH. D.
Assistant Professor of German

JAMES H. CUNNINGHAM, M. E. E.
Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

ALBERT S. EASTMAN, M. S.
Instructor in Chemistry

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

WALTER SCOTT HASTINGS, A. M.
Instructor in French

STANLEY PERKINS CHASE, PH. D.
Instructor in English

SAMUEL McCREA CAVERT, A. B.
Instructor in Greek

GILBERT ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

DEWITT CLINTON
Librarian

HUGO MUENSTERBERG, PH. D., M. D., LL. D., LITT. D.
Ichabod Spencer Lecturer on Psychology

Standing Committees of the Faculty

EDUCATION—Professors Ripton, Hoffman, Landreth, Stoller, Hale, Steinmetz, Bennett, Opdyke, Ellery, Barnes, March, McKean, McComber, Garis, Kennedy, Kellogg, Ferguson, Garrison

ADMISSIONS—Professors Barnes, Ripton, Landreth, Hale, Bennett, Opdyke, March, Garis, Kellogg, Ferguson, Garrison

STAGE APPOINTMENTS—Professors McKean, Ellery, March, Ferguson, Lyon

LIBRARY—Professors Hale, Landreth, Bennett and the Librarian

SCHOLARSHIPS—Professors Ripton, Bennett, Ellery

DISCIPLINE—Professors Ripton, Landreth, Hale, Bennett, Opdyke, March

STUDENT ACTIVITIES—Professors Opdyke, Bennett, McComber, McKean, Hale

SCHEDULE—Professor Garis, Mr. King, Mr. Taylor

ABSENCES—Professors Ellery, March, Ferguson

CATALOGUE—Professors Barnes, Opdyke, Garis

CONVENTIONS—Professors March, Landreth, Ferguson

PREPARATORY SCHOOLS—Professors Barnes, Ellery, Garis, Kellogg, Mr. King

SENIOR CLASS—Professors Stoller and Bennett, Mr. Callan

JUNIOR CLASS—Professors Ferguson, Lyon, Stewart

SOPHOMORE CLASS—Professors March and Kellogg, Mr. King

FRESHMAN CLASS—Professors Garis and McComber, Mr. Taylor

COLLEGE OFFICERS

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

President

President's Rooms, South Colonnade

BENJAMIN H. RIPTON, PH. D., LL. D.

Dean

College Office

Office Hours 2:30-4 P. M.*

FRANK BAILEY, ART. D.

Treasurer

175 Remsen St., Brooklyn

HARTLEY F. DEWEY

Assistant Treasurer

College Office

Office Hours 8 A. M.-5 P. M.*

FRANK COE BARNES, PH. D.

Secretary

Room 1, Washburn Hall

Office Hours 3-5 P. M.*

JAMES H. STOLLER, PH. D.

Curator of the Museum

DEWITT CLINTON

Librarian

Library Hours 8 A. M.-1 P. M., 2-6 P. M.*, 7:30-9 P. M.

ESTHER G. ELY, Recorder, and Secretary to the Dean

VIOLET K. WIKLE, Clerk to the Secretary

ANNE O'N. BEATTIE, Secretary to the President

ALMIRA R. WILCOX, Cataloguer in Library

*Except Saturday P. M.

COURSES OF STUDY

1. Courses leading to the Degree of A. B.

Classical Course A.—Greek, as indicated on p. 43 is required for admission to this course. Latin and Greek are required for two years, and are elective for the remainder of the course. French and German are included, in addition to the ancient languages.

Classical Course B.—This course may be pursued by candidates who satisfy the requirements for admission to the Ph. B. course. Greek is begun on entrance and required for four years. In other respects Course B is virtually identical with Course A.

2. Course leading to the Degree of Ph. B.

Latin-Scientific Course.—This course offers Latin without Greek, for which is substituted additional work in modern languages and science.

3. Course leading to the Degree of B. S.

Scientific Course.—This course is based upon the study of mathematics and the sciences, with extended work in English and other modern languages.

In courses 1, 2 and 3 the greater part of the work of the last two years is elective.

4. Courses leading to the Degree of B. E.

General Engineering Course.—This course offers the foundation of a broad engineering education, comprising mathematics, the sciences, the fundamental principles of the special branches of the profession, some training in history and economics, a knowledge of both French and German and a course in English. During the third and fourth years two alternative options are offered in this course:

Option A.—In this division the fundamental principles of advanced technical subjects receive emphasis.

Option B.—In this division studies are offered which lead to a training for engineering positions of an executive or administrative nature.

Six-Year Ph. B.-B. E. Course.—This course combines the above four-year engineering course, including both its options, with the Latin scientific course. The subjects of the two courses are interwoven throughout each term and the course thus offers in carefully arranged form a combined college and technical training.

Sanitary Engineering Course.—This differs from the general engineering course by substituting special work in sanitary engineering for some of the general engineering studies.

Electrical Engineering Course.—This course is intended to give a broad and thorough engineering education, with the specific instruction requisite for electrical engineering.

5. Courses leading to Graduate Degrees

Course leading to degree of M. C. E.—This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the general or the sanitary engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of M. E. E.—This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the electrical engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of Ph. D.—This course of two years' graduate study requires for admission the degree of M. E. E. or an equivalent. For details of the work see page 123.

Students in full standing at the end of junior year who have the profession of medicine in view are permitted to take the first year studies of the Albany Medical College as a substitute for the studies of the senior year in Union College. This enables medical students to lessen the time of their academic and professional studies by one year.

REQUIREMENTS FOR ADMISSION

Application and Registration

Blank forms of application to be filled out and forwarded in advance will be furnished by the secretary on request.

Candidates must be at least sixteen years old, and as a preliminary to registration, whether for examination or for enrollment, must present themselves at the office of the secretary on the date named in the calendar published in the college catalogue for the current year, and submit satisfactory testimonials of character.

Methods of satisfying the Requirements

By Examination

The regular entrance examinations are held on the Thursday and Friday immediately following Commencement, and on the Tuesday and Wednesday of the first week of the fall term. The schedule of examinations is published in the catalogue. Candidates for examination in any subject are expected to present a recommendation from their school principal.

By C. E. E. B. Certificate

Candidates may take the uniform entrance examinations offered by the College Entrance Examination Board. The examinations of the board are held in June of each year, and a list of the places at which they are to be held is published by the board about March 1st. Applications to attend the board's examinations must be addressed to the *Secretary of the College Entrance Examination Board, P. O. Sub-Station 84, New York, N. Y.*, and must be made upon a blank form to be obtained from the secretary of the board upon application. The certificates of this board will be accepted for all subjects passed at a satisfactory grade.

By Regents Diploma

The academic and college entrance diplomas issued by the New York State Education Department will be accepted so far as they cover the requirements for admission to the course desired.

By School Certificate

Certificates from schools approved by the faculty will be accepted for graduates of the school if they cover the requirements for admission to the course desired and contain a recommendation from the principal of the school that the candidate be admitted to college. Blank certificates, to be filled out by principals of schools, will be furnished upon application to the *Secretary of the Faculty, Union College, Schenectady, N. Y.*

So far as possible all credentials should be forwarded by July 10 of the year in which the candidate desires to enter, and it is expected that all certificates will be submitted not later than September 1st.

Students who enter the freshman class by certificate and fail to maintain their class standing are required to pass entrance examinations in the departments in which they have failed, if they apply for readmission.

Subjects Required for Admission to Each Course

Candidates for admission to the freshman class in any course must meet the requirements specified for that course in the subjects named below. The subjects are numbered as in the general list given on pages 33-41.

A.B. Course A

1. English: a, b.....	See Page 33.....	3 units
2. Greek: a, b, c.....	See Page 37.....	3 units
3. Latin: a, b, c, d.....	See Page 37.....	4 units
5. Mathematics: a, b.....	See Page 39.....	2½ units
7. History: a, b, c.....	See Page 41.....	2 units
8. Physiology.....	See Page 41.....	½ unit
		Total 15 units

A.B. Course B

1. English: a, b.....	See Page 33.....	3 units
3. Latin: a, b, c, d.....	See Page 37.....	4 units
4. Modern Languages: a or b...	See Page 38.....	2 units
5. Mathematics: a, b.....	See Page 39.....	2½ units
7. History: a, b, c.....	See Page 41.....	2 units
8. Physiology.....	See Page 41.....	½ unit
		Total 14 units

Ph.B. Course

1. English: a, b.....	See Page 33.....	3 units
3. Latin: a, b, c, d.....	See Page 37.....	4 units
4. Modern Languages: a or b...	See Page 38.....	2 units
5. Mathematics: a, b.....	See Page 39.....	2½ units
7. History: a, b, c.....	See Page 41.....	2 units
8. Physiology.....	See Page 41.....	½ unit

Total 14 units

B.S. Course

1. English: a, b.....	See Page 33.....	3 units
4. Modern Languages: a or b...	See Page 38.....	2 units
5. Mathematics: a, b, c.....	See Page 39.....	3 units
6. Physics.....	See Page 40.....	1 unit
7. History: c.....	See Page 41.....	1 unit
8. Physiology.....	See Page 41.....	½ unit
9. Electives.....	See Page 41.....	3½ units

Total 14 units

B.E. Course

1. English: a, b.....	See Page 33.....	3 units
4. Modern Languages: a or b...	See Page 38.....	2 units
5. Mathematics: a, b, c, d.....	See Page 39.....	3½ units
6. Physics.....	See Page 40.....	1 unit
7. History: c.....	See Page 41.....	1 unit
8. Physiology.....	See Page 41.....	½ unit
9. Electives.....	See Page 41.....	3 units

Total 14 units

Six-Year B.E.-Ph.B. Course

1. English: a, b.....	See Page 33.....	3 units
3. Latin: a, b, c, d.....	See Page 37.....	4 units
4. Modern Languages: a or b...	See Page 38.....	2 units
5. Mathematics: a, b, c, d.....	See Page 39.....	3½ units
6. Physics.....	See Page 40.....	1 unit
7. History: a, b, c.....	See Page 41.....	2 units
8. Physiology.....	See Page 41.....	½ unit
9. Electives.....	See Page 41.....	3 units

Total 19 units

Advanced Standing

Candidates from other colleges must bring letters of honorable dismissal, and upon the presentation of acceptable certificates will be admitted to corresponding standing.

Candidates for a degree must enter not later than the beginning of the senior year.

Requirements in Individual Subjects

1. English (3 units)

The books named in the following lists are prescribed for study in English.

Preparation for Part I ($1\frac{1}{2}$ units) should aim to give the power of clear and accurate expression, and a general knowledge of the substance of the books. In an examination the candidate will be called upon to write a paragraph or two on each of several topics, to be chosen from a considerable number—perhaps ten or fifteen—set before him in the examination paper. In every case the ability to write good English will be regarded as more important than knowledge of the books. It is important that the candidate shall be instructed in the fundamental elements of rhetoric. No candidate will be accepted in English whose work is notably defective in point of spelling, punctuation, grammar, or division into paragraphs.

Preparation for Part II ($1\frac{1}{2}$ units) should include a thorough study of each of the works named below, so as to give a knowledge of the subject-matter, form and structure. In addition, the candidate should be well grounded in the essentials of English grammar, and in the leading facts in those periods of English literary history to which the prescribed works belong. For the latter part of the work Newcomer's "Introduction to English Literature" and Moody and Lovett's "First View of English Literature" are recommended.

For students entering in 1912, the books required for reading and study will be as follows:—

List (1) for General Reading

Nine books are to be selected as follows:—

Group I (two to be selected)

Shakespeare's "As You Like It," "Henry V," "Julius Cæsar," "The Merchant of Venice," "Twelfth Night."

Group II (one to be selected)

Bacon's "Essays;" Bunyan's "The Pilgrim's Progress," Part I; "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography."

Group III (one to be selected)

Chaucer's "Prologue;" Spenser's "Faerie Queene" (Book I); Pope's "The Rape of the Lock;" Goldsmith's "The Deserted Village;" Palgrave's "Golden Treasury" (First Series) Books II and III, with especial attention to Dryden, Collins, Gray, Cowper and Burns.

Group IV (two to be selected)

Goldsmith's "The Vicar of Wakefield;" Scott's "Ivanhoe;" Scott's "Quentin Durward;" Hawthorne's "The House of the Seven Gables;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" Dickens' "A Tale of Two Cities;" George Eliot's "Silas Marner;" Blackmore's "Lorna Doone."

Group V (one to be selected)

Irving's "Sketch Book;" Lamb's "Essays of Elia;" De Quincey's "Joan of Arc" and "The English Mail Coach;" Carlyle's "Heroes and Hero Worship" (three lectures); Emerson's "Essays" (selected); Ruskin's "Sesame and Lilies."

Group VI (two to be selected)

Coleridge's "The Ancient Mariner;" Scott's "The Lady of the Lake;" Byron's "Mazeppa" and "The Prisoner of Chillon;" Palgrave's "Golden Treasury" (First Series) Book IV, with especial attention to Wordsworth, Keats and Shelley; Macauley's "Lays of Ancient Rome;" Poe's "Poems;" Lowell's "The Vision of Sir Launfal;" Arnold's "Sohrab and Rustum;" Longfellow's "The Courtship of Miles Standish;" Tennyson's "The Princess;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Evelyn Hope,"

"Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "The Boy and the Angel," "One Word More," "Hervé Riel," "Pheidippides."

List (2) for Minute and Critical Study

Shakespeare's "Macbeth;" Milton's "Lycidas," "Comus," "L'Allegro," and "Il Penseroso;" Burke's "Speech on Conciliation with America," or Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

For students entering in 1913, 1914 and 1915, the books required for reading and study will be as follows:

List (1) for General Reading

At least ten units—each unit is set off by semicolons—are to be selected, two from each group.

Group I

The "Old Testament," comprising at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings, and Daniel, together with the books of Ruth and Esther; the "Odyssey," with the omission, if desired, of Books I, II, III, IV, V, XV, XVI, XVII; the "Iliad," with the omission, if desired, of Books XI, XIII, XIV, XV, XVII, XXI; Virgil's "Aeneid." The Odyssey, Iliad, and Aeneid should be read in English translations of recognized literary excellence.

For any unit of the above group a unit from any other group may be submitted.

Group II

Shakespeare's "Merchant of Venice," "A Midsummer Night's Dream," "As You Like It," "Twelfth Night," "Henry the Fifth," "Julius Cæsar."

Group III

Defoe's "Robinson Crusoe, Part I;" Goldsmith's "Vicar of Wakefield;" either Scott's "Ivanhoe" or "Quentin Durward;" Hawthorne's "House of the Seven Gables;" either Dickens' "David Copperfield" or "Tale of Two Cities;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" George Eliot's "Silas Marner;" Stevenson's "Treasure Island."

Group IV

Bunyan's "Pilgrim's Progress, Part I;" "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography;" Irving's "Sketch Book;" Macaulay's "Essays on Lord Clive" and "Warren Hastings;" Thackeray's "English Humourists;" "Selections" from Lincoln, including at least the two Inaugurals, the Speeches in Independence Hall and at Gettysburg, the Last Public Address, and Letter to Horace Greeley, with a brief memoir or estimate; Parkman's "Oregon Trail;" either Thoreau's "Walden," or Huxley's "Autobiography" and selections from "Lay Sermons," including the addresses on Improving Natural Knowledge, A Liberal Education, and A Piece of Chalk; Stevenson's "Inland Voyage" and "Travels with a Donkey."

Group V

Palgrave's "Golden Treasury (First Series), Books II and III," with especial attention to Dryden, Collins, Gray, Cowper, and Burns; Gray's "Elegy in a Country Churchyard" and Goldsmith's "Deserted Village;" Coleridge's "Ancient Mariner" and Lowell's "Vision of Sir Launfal;" Scott's "Lady of the Lake;" Byron's "Childe Harold," Canto IV, and "Prisoner of Chillon;" Palgrave's "Golden Treasury" (First Series), Book IV, with especial attention to Wordsworth, Keats, and Shelley; Poe's "Raven," Longfellow's "Courtship of Miles Standish," and Whitier's "Snow Bound;" Macaulay's "Lays of Ancient Rome" and Arnold's "Sohrab and Rustum;" Tennyson's "Gareth and Lynette," "Lancelot and Elaine," and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "Hervè Riel," "Pheidippides," "My Last Duchess," "Up at a Villa-Down in the City."

List (2) for Minute and Critical Study

Shakespeare's "Macbeth;" Milton's "Lycidas," "L'Allegro," "Il Penseroso," and "Comus;" either Burke's "Speech on Conciliation with America," or both Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" either Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

2. Greek (3 units)

a. Grammar and Composition (1 unit). The common forms, idioms, and constructions, and the general grammatical principles of Attic Greek prose. Translation into Greek of detached sentences and very easy continuous prose based upon the *Anabasis*.

b. Xenophon (1 unit). The first four books of the *Anabasis*.

c. Homer (1 unit). The first three books of the *Iliad* (omitting II, 494-end) and the Homeric constructions, forms and prosody.

In connection with the reading in Greek there should be constant practice in sight translation and in prose composition.

The attention of instructors is particularly directed to the student's need of a full and accurate knowledge of the Greek grammar.

3. Latin (4 units)

a. Grammar and Composition (1 unit). The inflections; the simpler rules for composition and derivation of words; syntax of cases and the verbs; structure of sentences in general, with particular regard to relative and conditional sentences, indirect discourse, and the subjunctive. Translation into easy Latin of detached sentences and very easy continuous prose based upon Caesar and Cicero.

b. Caesar (1 unit). Any four books of the *Gallic War*.

c. Cicero (1 unit). Any six orations from the following list, or equivalents: The four orations against Catiline, Archias, The Manilian Law, Marcellus, Roscius, Milo, Sestius, Ligarius, the fourteenth Philippic.

d. Vergil (1 unit). The first six books of the *Aeneid*, and so much prosody as relates to accent, versification in general, and dactylic hexameter.

Equivalents in b, c, or d, will be accepted at the discretion of the head of the department.

Every student is required to use in the college class room the "Roman Method" of pronunciation, and is expected to have had practice in this method at school.

4. Modern Languages (2 units)

a. German (2 units). Two years' work will be necessary to meet this requirement.

During the first year the work should comprise: (1) careful drill upon pronunciation; (2) the memorizing and frequent repetition of colloquial sentences; (3) drill upon the rudiments of grammar, that is, upon the inflection of the articles, of such nouns as belong to the language of every-day life, of adjectives, pronouns, weak verbs, and the more usual strong verbs; also upon the use of the more common prepositions, the simpler uses of the modal auxiliaries, and the elementary rules of syntax and word-order; (4) abundant easy exercises designed not only to fix in mind the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; (5) the reading of from 75 to 150 pages of graduated texts from a reader, with constant practice in translating into German easy variations upon sentences selected from the reading lesson, the teacher giving the English, and in reproducing from memory sentences previously read.

During the second year the work should comprise: (1) the reading of from 150 to 250 pages of literature in the form of stories and plays; (2) accompanying practice, as before, in the translation into German of easy variations upon the matter read and also in the off-hand reproduction, sometimes orally and sometimes in writing, of the substance of short and easy selected passages; (3) continued drill upon the rudiments of the grammar, with constant application in the construction of sentences.

b. French (2 units). Two years' work will be necessary to meet this requirement.

During the first year the course should include: (1) careful drill in pronunciation; (2) the rudiments of grammar, including the inflection of the regular and the more common irregular verbs, the plural nouns, the inflection of adjectives, participles, and pronouns; the use of personal pronouns, common adverbs, prepositions, and conjunctions; the order of words in the sentence and the elementary rules of syntax; (3) abundant easy exercises, designed not only to fix in the memory the forms and principles of grammar, but also to cultivate readiness in the

reproduction of natural forms of expression; (4) the reading of from 100 to 175 duodecimo pages of graduated texts, with constant practice of translating into French easy variations of the sentences read, the teacher giving the English, and in reproducing from memory sentences previously read; (5) writing French from dictation.

During the second year the work should comprise: (1) the reading of from 250 to 400 pages of easy modern prose in the form of stories, plays, or historical or biographical sketches; (2) constant practice, as in the previous year, in translating into French easy variations upon the texts read; (3) frequent abstracts, sometimes oral and sometimes written, or portions of the text already read; (4) writing French from dictation; (5) continued drill upon the rudiments of grammar, with constant application in the construction of sentences; (6) mastery of the forms and use of pronouns, pronominal adjectives, of all but the rare irregular verb forms, and of the simpler uses of the conditional and subjunctive.

5. Mathematics ($2\frac{1}{2}$ units; 3 units; $3\frac{1}{2}$ units)

a. Algebra ($1\frac{1}{2}$ units). The four fundamental operations for rational algebraic expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions, ratio and proportion; linear equations, both numerical and literal, containing one or more unknown quantities; problems depending on linear equations radicals, including the extraction of the square root of polynomials and of numbers; exponents, including the fractional and negative.

Simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations.

Problems depending upon quadratic equations.

The binomial theorem for positive integral exponents.

The formulas for the n th term and the sum of the terms of arithmetic and geometric progressions, with applications.

b. Plane Geometry (1 unit). The usual theorems and con-

structions of good text-books, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle.

The solution of numerous original exercises, including loci problems.

Application to the mensuration of line and plane surfaces.

c. Solid Geometry ($\frac{1}{2}$ unit). The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders, and cones; the sphere and the spherical triangle.

The solution of numerous original exercises, including loci problems.

Applications to the mensuration of surface and solids.

d. Trigonometry ($\frac{1}{2}$ unit). Definitions and relations of the six trigonometric functions as ratios; circular measurement of angles.

Proofs of principal formulas, in particular for the sine, cosine, and tangent of the sum and the difference of two angles, of the double angle and the half angle, the product expressions for the sum or the difference of two sines or of two cosines, etc.; the transformation of trigonometric expressions by means of these formulas.

Solution of trigonometric equations of a simple character.

Theory and use of logarithms (without the introduction of work involving infinite series).

The solution of right and oblique triangles, and practical applications.

6. Physics (1 unit)

An elementary knowledge of physics, such as may be gained by a year's course of study covering mechanics, sound, heat, light and electricity, as treated in any standard high school text book. Preparation should include individual laboratory work, attested by a note-book, comprising at least thirty-five exercises, chiefly quantitative.

7. History (1 unit; 2 units)

a. Greek History ($\frac{1}{2}$ unit). In this study must be included the geography of ancient Greece.

b. Roman History ($\frac{1}{2}$ unit). In this study must be included the geography of the Roman Empire.

c. History of the United States (1 unit).

Elementary United States history will be accepted if the candidate presents in addition a year of history not otherwise required.

8. Physiology ($\frac{1}{2}$ unit)**9. Electives (3 units)**

To complete the requirements for admission to the B. S. course three and one-half units, and for admission to the B. E. course three units may be offered from the following list:

Spanish 1.....(1)	Greek History.....($\frac{1}{2}$)
Spanish 2.....(1)	Roman History.....($\frac{1}{2}$)
German 3.....(1)	English History.....(1)
French 3.....(1)	Civics.....($\frac{1}{2}$)
Chemistry.....(1)	Drawing.....(1)
Biology.....(1)	Spherical Trigonometry.....($\frac{1}{2}$)
Zoölogy.....(1)	History of English Literature....($\frac{1}{2}$)
Botany.....(1)	Greek: 1, 2, 3.....(3)
Physical Geography...(1)	Latin: 1, 2, 3, 4.....(4)

The figure in parenthesis after each subject shows the unit value of that subject.

Entrance Examinations in 1912

Entrance examinations will be held at the college in June and in September, in accordance with the schedule given below. A fee of five dollars is required at the time of registration.

Only those who register at the appointed time will be admitted to the examinations of the following days.

Schedule of the June Examinations

Thursday, June 13

9 A. M. Candidates register at the office of the secretary.

Mathematics a. (Algebra complete).....	II	A. M. to	I	P. M.
Physiology.....	"	"	"	"
History a-c. (American and ancient).....	2	P. M. to	4	P. M.
Physics.....	"	"	"	"
English (Parts I and II).....	3	P. M. to	5	P. M.

Friday, June 14

Latin.....	9	A. M. to	II	A. M.
Mathematics c. (Solid Geometry).....	"	"	"	"
German (intermediate).....	II	A. M. to	I	P. M.
French (intermediate).....	"	"	"	"
Greek.....	2	P. M. to	4	P. M.
Mathematics b. (Plane Geometry).....	"	"	"	"
Mathematics d. (Plane Trigonometry).....	"	"	"	"

Schedule of the September Examinations

Monday, September 16

9 A. M. Candidates register at the office of the secretary.

Tuesday, September 17

Physics.....	9	A. M. to	II	A. M.
History a-c. (American and ancient).....	"	"	"	"
Physiology.....	"	"	"	"
Mathematics a. (Algebra complete).....	II	A. M. to	I	P. M.
English (Parts I and II).....	3	P. M. to	5	P. M.

Wednesday, September 18

Latin.....	9	A. M. to	II	A. M.
Mathematics c. (Solid Geometry).....	"	"	"	"
German (intermediate).....	II	A. M. to	I	P. M.
French (intermediate).....	"	"	"	"
Greek.....	2	P. M. to	4	P. M.
Mathematics b. (Plane Geometry).....	"	"	"	"
Mathematics d. (Plane Trigonometry).....	"	"	"	"

DEPARTMENTS OF INSTRUCTION

The Greek Language and Literature

PROFESSOR BENNETT AND MR. CAVERT

In course A, leading to the degree of Bachelor of Arts, Greek is required during the freshman and sophomore years, and may be elected during the junior and senior years; in course B, leading to the degree of Bachelor of Arts, Greek is begun on entrance and required for four years.

1. **Greek Grammar; Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phædo; **Aristophanes:** The Clouds.

Required of freshmen in course A. Four hours weekly throughout the year.

2. **The Elements of Greek**

Required of freshmen in course B. Four hours weekly throughout the year.

3. **Aeschylus:** Prometheus Vinctus; **Sophocles:** Oedipus Tyrannus; **Euripides:** Medea; **Herodotus; Homer.**

Required of sophomores in course A. Three hours weekly throughout the year.

4. **Xenophon:** The Anabasis

Required of sophomores in course B. Three hours weekly throughout the year.

5. **Homer; Thucydides**

Elective for juniors in course A. Two hours weekly throughout the year.

6. **Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phædo.

Required of juniors in course B. Two hours weekly throughout the year.

7. **Aeschines:** Against Ctesiphon; **Demosthenes:** De Corona; **Theocritus.**

Elective for seniors in course A. Two hours weekly throughout the year.

8. Homer

Required of seniors in course B. Two hours weekly throughout the year.

The above courses are typical only. The books read are varied from year to year.

9. **Honors:** Honors in Greek are awarded in course A. Candidates are required to take all the work offered in the course, to maintain a general average of ninety per cent. in that work, to meet for two additional hours a week during the first two terms of the senior year for the study of a Greek text, and to write theses on assigned subjects.

The Latin Language and Literature

PROFESSOR KELLOGG

The studies of this department are required, in the freshman and sophomore years, of all students who are candidates for either one of the two degrees, A. B. and Ph. B. In the junior and senior years Latin becomes an elective study, except for students who are candidates for honors in Latin; of them it is required.

1. **Livy:** Selections from Books I, XXI and XXII. Roman history.—**Tacitus:** Agricola and Germania.—**Cicero:** De Senectute or De Amicitia or De Officiis (Book I). Latin composition.

The work of the first year includes a thorough review of forms and syntax through oral and written prose composition and sight reading. Selections from the three great masters of Roman prose are made the basis for grammatical and literary analysis and interpretation, and also, through lectures and assigned reading, for the study of Roman history through the reign of Trajan.

Required of freshmen in the A. B. and Ph. B. courses. Four hours weekly throughout the year.

2. **Terence:** Adelphoe.—**Plautus:** Menaechmi or an equivalent
Horace: Selected Odes and Epodes. **Catullus:** Selected poems.

Through lectures on ancient comedy and lyric, and by collateral reading, the student is made acquainted with the history of Roman literature under the Republic. The grammatical analysis aims to make familiar the chief characteristics of early and colloquial Latin, and the general economy of poetic diction: the literary interpretation centers chiefly around the influence of Greek life and thought on Roman literature, and the national and personal elements in Latin poetry.

Required of sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. **Horace** (Satires and Epistles) and **Juvenal**. **Pliny the Younger** or **Cicero** (Letters).

This course, through lectures and assigned reading, continues the history of Roman literature under the Empire. A brief introduction to Roman archaeology (with special study of the Forum Romanum) will be given, and in connection with the Pliny an outline of the private life of the Romans.

Elective for juniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

4. **Lucretius**: Books III and V and Selections, with lectures on didactic poetry, the atomic theory, and the philosophic system of Epicurus. The literature of the Empire will be illustrated by readings from **Seneca** (Moral Epistles) or **Quintilian** (Book X on literary criticism) or **Suetonius** (Lives of Julius Caesar and Augustus) or **Martial** (Selected Epigrams).

As this course is not only for those who elect to study Roman life and literature but also for those who may desire to use Latin in teaching or as an instrument in later research work, special assignments are given from authors or inscriptions for practice in editing, or the writing of history from the sources.

Elective for seniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

In general, subsidiary reading will be recommended. Equivalents may be substituted in the elective programme at any time, and the order of the subjects as given above may be altered in any one of the four years, at the discretion of the head of the department.

5. **Honors:** Candidates for special honors in Latin are required to take the Latin of the four years; to do additional reading in private, to be indicated by the department; and to prepare a thesis on some subject directly related to the work of the class room.

Modern Languages

PROFESSOR BARNES, ADJUNCT PROFESSOR MARCH
ASSISTANT PROFESSOR STEWART AND MR. HASTINGS

A reliable practical knowledge of the language studied is the first result aimed at in all the classes, but as soon as possible the literary side of the language is brought to the front, and good books are read for what they contain. The more advanced courses vary somewhat from year to year, according to the judgment and preference of the instructors, and the ability and character of the students composing the classes.

German

1. **Elementary.** Grammar study: with exercises and supplementary composition; reading and memorizing; use of German in class. German reader and selections on popular scientific subjects.

Required in all courses of freshmen who offer French at entrance. Three hours weekly throughout the year.

1a. **Elementary.** Grammar, reader and exercises. Schiller: Wilhelm Tell; Goethe: Hermann and Dorothea.

Required of sophomores in the A. B. course and of freshmen as in 1 who have had one year of German in school. Three hours weekly throughout the year.

2. **Intermediate.** Grammar for review and reference; connected composition; use of German in class. The time in class is devoted to the reading and discussion of selected works from the German classics and from recent drama and fiction; matter is also assigned for outside reading with reports and examination on the work done. The work varies from year to year, but aims to give every class an acquaintance with some of the masterpieces of German literature and some knowledge of present day German life and institutions.

Required in the Ph. B., B. S. and B. E. courses of freshmen who offer German at entrance; in the A. B. (B.), Ph. B. and B. S. courses of sophomores who have had German 1; and in the A. B. course of Sophomores who have had two years of German before entrance. Elective in the A. B. course of juniors who have had 1a. Three hours weekly throughout the year in the Ph. B. and B. S. (or A. B.) courses and during terms 1 and 2 in the B. E. course.

2a. Intermediate. This is a course in the reading of scientific German. A reader consisting of selections on scientific subjects forms the basis of the work and is supplemented by one or more monographs on technical subjects within the grasp of the class at this stage of its work.

Required, during the third term, of B. E. members of German 2. Three hours weekly through the term.

3. Advanced. Nineteenth century drama, development and leading representatives. Readings from Von Kleist and Grillparzer. *Das junge Deutschland*; assigned study. Readings from Hebbel, Ludwig and Von Wildenbruch. *Die freie Bühne*; assigned study. Nineteenth century fiction. Readings from Sudermann, Hauptmann, Meyer, Scheffel and others.

Elective for juniors in the Ph. B. and B. S. courses who have done 2 with a grade of 80 or 2a with a grade of 85, and for juniors in the A. B. course who have done 1a with a grade of 90. Required, as an alternate with French, of sophomores in the Ph. B. and B. S. courses who in freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

3a. Advanced. Goethe and the classical period, readings and assigned studies. Lessing: *Nathan der Weise*, *Emilia Galotti*; Schiller: *Wallenstein*, *Maria Stuart*, *Jungfrau von Orleans*. Outline study of the lives of these writers. Koch: *Geschichte der deutschen Literatur* as a handbook, with references to other works.

This course alternates with course 3 and is given under the same conditions.

3b. Special. This course is given in three sections: (a) A course in composition and conversation, based on Stern's *Geschichten von deutschen Städten* or a similar work; (b) A course in commercial German, consisting of reading, correspondence and newspaper work; (c) A course in the reading of historical and political matter, with composition based on the articles read.

This course may be substituted for course 3a, and is given under the same conditions.

4. Advanced. Goethe: (1) A study of Goethe's life and works with readings from his autobiography and epic writings: *Egmont*, *Iphigenie auf Tauris*, *Torquato Tasso*. (2) *Faust*: Part I. reading and interpretation; the *Faust* legend in literature.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have had necessary previous training. This course will ordinarily follow course 3. Two hours weekly throughout the year.

4a. Advanced. (a) History of German literature: Reading and discussion in class with references to various works, accompanied by *Musterbuch* and special assignments. (b) A course in Middle High German: Grammar and reading, supplemented by an outline study of the history of the language. Two hours weekly throughout the year.

This course alternates with course 4 and is given under the same conditions. It is expected that those electing it will have had course 3a. It is intended primarily for students who are preparing to teach German.

4b. Special. This course consists in the reading of one or more historical monographs and, when time allows, a historical novel, with parallel readings; followed by a careful study of a number of political speeches and parliamentary addresses, with discussion of the topics involved; supplemented by the reading of newspaper reports and editorial articles. The work aims to lay the foundation for future study along these lines and to give some insight into present governmental and social conditions in Germany.

This course may be substituted for course 4a, and is given under the same conditions.

5. **Honors.** Special courses, open only to members in good standing in senior elective German, are offered to candidates for honors in this department.

French

1. **Elementary.** Grammar and the reading of simple French texts. Constant drill in grammatical forms, common idioms, pronunciation and writing to dictation.

Required of freshmen in the A. B. course (A); of freshmen in the A. B. (B), Ph. B., B. S., and B. E. courses who offer German at entrance. Three hours weekly throughout the year.

1a. **Elementary.** Grammar reviewed; composition; selected readings of second year or higher grade.

Required, in place of French 1, of those who have had one year of French before entrance.

2. **Intermediate.** Grammar reviewed; composition, writing to dictation, and memorizing. In addition to daily translation in class, easy reading is assigned to be done outside and reported upon. Since this course is for most students the last required French in college, it is devoted to selected works of various periods. The number and character of the books read may vary considerably from class to class.

Required of freshmen in the Ph. B. and B. S. courses who offer French at entrance; in the A. B. course of those who have had two years of French before entrance. Three hours weekly throughout the year.

2a. **Intermediate.** This course is similar to course 1a.

Required of sophomores in the A. B. (B), Ph. B. and B. S. courses who have had French 1. Three hours weekly throughout the year.

3. **Advanced.** French literature of the 19th century. Discussion of various authors and of some phases of modern French life and character; assigned reading; careful translation in class. With suitable classes, attention is paid to French etymologies, and the laws of the evolution of the language.

Elective for juniors of the A. B., Ph. B. and B. S. courses. Required, as an alternate with German, of sophomores in the Ph. B. and B. S. courses who in freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

4. **Advanced.** French literature of the 17th century. Selected works of Corneille, Racine, Molière, and La Fontaine, are read carefully in class. Assigned readings, discussions of men, of their work and of the period.

Elective for seniors of the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

This course may in any year be a continuation of course 3.

5. **Honors.** Advanced courses, leading to special honors in French, are offered to those students who are qualified to pursue them.

Spanish

1. **Junior Elective.** Grammar, exercises and reader; practice and sight translation. Selections from *Gil Blas*, a recent novel and a modern play are read.

Open to juniors in the A. B., Ph. B. and B. S. courses and to seniors who have not had Spanish in junior year. Three hours weekly throughout the year.

2. **Senior Elective.** Grammar and composition. One or two dramas of the classical period and one or two modern plays are read, together with some works of recent fiction. The amount read depends upon the nature of the works selected and the ability of the students composing the class.

Open to seniors who have had Spanish 1. Two hours weekly throughout the year.

The English Language and Literature

PROFESSOR HALE AND DR. CHASE

1. **Rhetoric and Composition.** The aim of this course is to train the student in the use of clear and correct English, written and spoken. The work will consist of the study of rhetorical principles and practice in composition. In 1911-12 Canby's "English

Composition" and Woolley's "Handbook of Composition" will be used as text-books. A certain amount of outside reading from English authors will also be assigned. Usually, two short themes a week will be required, and at intervals of six weeks longer themes. Each student will meet the instructor in personal conferences for advice about his individual work.

Required of freshmen in all courses. Two hours weekly throughout the year.

2. Essays. The practice of English composition will be carried on throughout the course. As a rule two essays a term will be written, which will be corrected and criticised in individual conferences with the instructor.

Required of sophomores, juniors and seniors in all courses. The requirement for senior engineers includes but one literary essay.

3. Introduction to English Literature. This course has two objects, an intimate acquaintance with a few masterpieces of English literature, and a knowledge of the historical development of the literature in modern times. During the fall term are studied representative examples of four types of literature: the novel, the drama, lyric poetry, criticism. The particular works selected in 1911 are Scott's "Kenilworth," Shakespeare's "Othello," a selection from Palgrave's "Golden Treasury," and Arnold's "Culture and Anarchy." The aims of this work are to train the student in the habit of careful reading; to help him to recognize in each work studied its peculiar merit; and, through the writing of two essays, to develop his analytical ability and his power of expression.

During the winter and spring terms the course traces the development of English literature from the time of Shakespeare to the time of Tennyson. The works read include Shakespeare's "Henry IV.," Part I., "As You Like It," "Hamlet," and "The Tempest;" Milton's "Samson Agonistes" and a part of "Paradise Lost;" Pope's "Moral Essays" and "Epistle to Dr. Arbuthnot;" Wordsworth's "Prelude" and other poems; Tennyson's "In Memoriam" and other poems. The same aims are kept in view

as were observed in the earlier part of the course; but the historical aspects of literary development will not be neglected.

Required of sophomores in all courses. Two hours weekly throughout the year.

4. English Prose. This course consists of a study of three prose forms, the Short Story, the Novel, and the Essay. In each case especial attention is given to the general character of the literary form in question and the specific character of the authors or works that are treated. In the first term the Short Story as developed in America from the time of Irving is taken as a foundation for study. In the winter the Novel is treated in a more general manner, so as to include the chief English and American novelists of the nineteenth century. In the spring the Essay is studied with more attention to the historic development of the literary form.

Required of juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

5. English Poetry. An introduction to the critical study of poetry. Page's "British Poets of the Nineteenth Century" furnishes a collection of texts in which the work may readily be followed. The main plan is to form habits of discrimination, and a poetic taste by distinguishing between the characteristics of the different poets read.

Elective for seniors in all courses. Two hours weekly throughout the year.

6. Shakespeare. A study of plays chosen to represent the different periods of Shakespeare's life and the different forms of the Shakespearean drama. Six plays will be read each year, different plays being chosen each year from those of the year before. In 1910-1911 the chief tragedies were read.

Elective for seniors and juniors in all courses. One hour weekly throughout the year.

7. Old English. This course gives an introduction to the language in Cook's First Book in Old English, with especial attention to the phonology and the relations of Old and Modern

English with the other Teutonic languages. In the third term the work is carried on either by a study of Old English poetry in "Beowulf" or by further reading in West Saxon prose, especially the Chronicle.

Elective for juniors in all courses. Two hours weekly throughout the year.

8. History of the English Language. This course follows the history of the language with more especial reference to phonetics and spelling, word formation including inflections, vocabulary including changes of meaning, and syntax.

Elective for seniors in all courses. Two hours weekly throughout the year.

9. Honors. An advanced course leading to special honors is offered to those students who are qualified to pursue it. In 1910-1911 the topic was "The Novels of Dickens, with especial reference to the personal element."

Rhetoric and Public Speaking

PROFESSOR MCKEAN

8. Sophomore Orations. The work consists of three distinct parts: viz., (a) the writing of orations under individual criticism; (b) the special preparation of the same for oral presentation, under individual criticism based upon the general principles of public speaking and upon the personal needs of the student; and (c) the delivery of these orations before the class, subject to still further criticism for general instruction.

Required of sophomores in the A. B., Ph. B. and B. S. courses during the second and third terms, and in the B. E. course throughout the year. One hour weekly.

9. Junior Orations. The work is like that of course 2, but of an advanced character.

Required of juniors in all courses. One hour weekly throughout the year.

10. Senior Orations. The work is like that of course 2, but of a more advanced character.

Required of seniors in the A. B., Ph. B. and B. S. courses. One hour weekly throughout the year.

11. Argumentation and Debate. The work consists of two distinct parts: viz., (a) the study of the theory of argumentation and debate, pursued by means of recitations, criticisms, discussions and informal lectures, based upon a text-book; and (b) considerable practice in the analysis of subjects for debate, in the preparation of briefs and arguments, and in the more formal debates of the class room—all subject to criticism and discussion.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

12. Advanced Argumentation and Debate. The work is of a more advanced character than that in course 4, and consists principally of class-room debates throughout the year, formally conducted and subject to criticism and discussion.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have completed course 4. Two hours weekly throughout the year.

History and Government

PROFESSOR RIPTON

The work of the department covers three years, beginning with the first term of the sophomore year. The instruction is given by text-book, by lectures, and by library references.

1. Medieval and Modern History. The course begins with a brief study of the Roman Empire and the contribution of the ancient world to modern civilization. Attention is given to events which have had permanent influence upon the historical development of Europe, and to institutions of enduring importance; among these may be named the medieval church, the feudal institutions, the French monarchy, and the English constitution. The course is designed to form a foundation of historical knowledge which may serve as a preparation for any further study, and to give to the student some acquaintance with methods of historical study and the use of authorities and sources.

Required of sophomores in the A. B., Ph. B. and B. S. courses, and of juniors in the B. E. course, Option B. Two hours weekly throughout the year.

2. American History. A study is made of the period of Ameri-

can discovery and exploration and of the colonial period. The main part of the work, however, begins with an examination of the causes of the American Revolution. The course is guided by text-books and lectures, and much work is done in the library among the sources and authorities.

Elective for juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Required of juniors in the B. E. courses. Two hours weekly throughout the year.

3. French Revolution and Nineteenth Century. This course considers the causes, ideas and progress of the French Revolution and the reconstruction of European politics and society produced by the revolutionary and Napoleonic wars. Attention is then directed to the development of the spirit of nationality, especially in Italy and Germany, and a careful study is made of the political, economic and social progress of Great Britain and the continental states. The course is designed to give a clear understanding of conditions in Europe to-day and the historical processes by which they were brought about.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

4. Comparative Politics. A comparative study is made of the constitutions and governments of England, the United States, and the principal nations of continental Europe. Sufficient attention is given to historical origins to account for characteristic differences, but the work consists mainly of a systematic study of the constitutions, their adoption and methods of amendment, the distribution of governmental powers, and their practical operation, including some account of political parties. The course concludes with a study of the principles of International Law.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Required of Seniors in the B. E. course, Option B. Three hours weekly throughout the year.

5. Honors. Candidates for special honors in history are assigned subjects for study which are designed to give training in historical method and the use of sources.

Philosophy

PROFESSOR HOFFMAN

The courses in this department begin with the first term of the junior year and extend through the entire senior year. Logic, elementary psychology and elementary ethics come in the junior year and are required. All the other courses are taken up in the senior year and are elective. Instruction in the various studies of the department is usually given by means of lectures, discussions, and the use of a text-book.

1. **Logic.** This study, inasmuch as it is required, is confined to the simple elements of the science. As soon as the rules of correct thinking are mastered, the student is put at once to the analysis of arguments, the chief purpose of the study being to develop skill in detecting fallacies. Extracts from many authors are brought before the class for criticism, and so far as possible they are taken from every field of thought.

Required of juniors in the A. B., Ph. B. and B. S. courses, and of seniors in the B. E. course, electrical division. Three hours weekly during the first term.

2. **Elementary Psychology.** This course is designed to acquaint the student with the most obvious facts of his mental experience; and the attempt is made to classify these facts into a system. The relation of psychology to the other sciences is set forth, and the importance of the study is emphasized in that it lays the foundation for all the sciences of man as a political, moral and religious being.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term.

3. **Elementary Ethics.** Only the outlines of the subject are presented in this course. The ordinary duties of man are pointed out by first describing those concerning himself and those that arise from his relation to others, to nature, and to God.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. **Advanced Psychology.** The chief problems discussed in this course are the recent views concerning the nature of per-

ception, the localization of functions and the theories concerning memory, conception, the emotions and the will. The facts of abnormal psychology, are also here considered, especially insanity, dreams, hypnotism, telepathy, and the hypothesis of a secondary self.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during first term.

5. Advanced Ethics. Some account of the history of ethics is given in this course, and present ethical theories are stated and discussed. The relation of ethics to other sciences is emphasized and much attention is given to the ethical problems involved in such questions as education, taxation, transportation, corporations, the treatment of criminals, the care of the poor, and the formation and dissolution of the family.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during second term.

6. Evolution of Religion. The object of this course is to show how religion originates and to trace out the steps taken in its development. The chief ideas of the leading religions of the heathen world are critically examined, their excellencies and defects are pointed out, and a comparison of them is made with the special doctrines of the Christian system.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

7. History of Philosophy. The attempt is made in this course to go over with considerable detail the general field of philosophy from the earliest times down to the present day. In this way the views of the principal thinkers of the world are presented and discussed upon a great variety of problems, such as the validity of knowledge, the nature of virtue, the foundations of the State and the existence of God. Much is made in this course of the historical connection of the different systems for the purpose of impressing upon the mind of the student the successive steps that have been taken in the actual development of thought.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Economics and Sociology

PROFESSOR KENNEDY

1. **Economic History.** The economic history of England from the tenth century to the present time, and the leading events in the economic history of the United States are considered.

Required of seniors in the A. B., Ph. B., B. S. courses, and in the B. E. course, Option B. Three hours weekly during the first term.

2. **Elements of Economics.** General economic theory is studied; special attention is given to the theory of distribution and its relation to economic problems.

Required of seniors in the A. B., Ph. B. and B. S. courses, and in the B. E. course, Option B. Three hours weekly during second and third terms.

3. **Elements of Economics.** Designed to give a brief study of the general principles of economics and an application of these to practical economic problems.

Required of seniors in the B. E. course: G. E., Option A, and E. E. Three hours weekly during first term.

4. **The Principles of Sociology.** A study of the origin, growth, structure, and activities of society, with a view of acquiring a systematic description and explanation of social phenomena as a whole.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly during the first term.

5. **Charities and Corrections.** Cause of degeneracy, treatment of dependents and delinquents. Particular attention is given to causes of poverty and crime, the method of treatment, and the responsibility of the community.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly during the second and third terms. Follows course 4.

Mathematics

PROFESSOR GARIS

Mathematics is required in the A. B., Ph. B. and B. S. courses during the freshman year and is elective during the sophomore, junior and senior years. The object of the instruction in these courses is to train the student to clear and exact thinking and to provide him with a knowledge of mathematics broad enough to enable him to give instruction in preparatory schools or to pursue his studies further to good advantage.

The following courses are given:

1. Solid Geometry.

Required of freshmen in the A. B. and Ph. B. courses during the first term. Four hours weekly.

2. Higher Algebra.

Required of freshmen in the A. B. and Ph. B. courses during the second term. Four hours weekly.

2a. Higher Algebra.

Required of freshmen in the B. S. course during the first term. Five hours weekly.

3. Trigonometry.

Required of freshmen in the A. B. and Ph. B. courses during the third term. Four hours weekly.

3a. Trigonometry.

Required of freshmen in the B. S. course during a part of the second term. Five hours weekly.

4. Analytic Geometry.

Required of freshmen in the B. S. course during a part of the second term and during the third term. Five hours weekly.

4a. Analytic Geometry.

Elective for sophomores in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

5. Differential Calculus.

Elective for sophomores in the B. S. course and for juniors in the A. B. and Ph. B. courses who have had 4a. Two hours weekly throughout the year.

6. Integral Calculus.

Elective for juniors in the B. S. course and for seniors in the A. B. and Ph. B. courses who have had 5. Two hours weekly throughout the year.

7. Differential Equations.

Elective for seniors in the B. S. course who have had 6. Two hours weekly throughout the year.

8. Honors. Candidates will be given advanced work in various subjects suited to their special ability.

Open to seniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

Mechanics and Physics

PROFESSOR OPDYKE

The required work in physics extends through the three terms of the sophomore year. This is followed by electives in laboratory work and in mathematical physics. The collection of apparatus for the illustration of lectures is extensive, and has been secured largely from foreign makers, including sets of standard pattern by Koenig, Duboscq, Ruhmkorff and others.

The courses in greater detail are these:

1. General Physics. This course is intended to give a general presentation of the facts and laws of physics. No knowledge of mathematics is assumed beyond an acquaintance with algebra and plane trigonometry. Experimental lectures, recitations and discussions aim to make the student familiar with the chief phenomena of physics and their explanation.

Required of sophomores in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

1a. Elective in Laboratory Work. This course is open to those who have taken 1, and consists of individual work by the students themselves in the laboratory. The experiments performed are such as allow accurate measurement of the quantities involved; and the results obtained are used to verify some general law, or to obtain some physical constant of nature.

Elective for juniors and seniors in the A. B., Ph. B. and

B. S. courses. Two periods of two hours each weekly throughout the year.

2. General Physics for Engineers. This course treats the subject more mathematically than 1, and is given to students in the engineering course. The calculus is used, more especially during the second and third terms. Assuming some knowledge of the fundamental facts of physics, attention is paid to the discussion of the phenomena and their mathematical analysis, in so far as this is possible with the use of the more elementary analytical methods. The work consists of lectures, recitations and laboratory practice.

Required of sophomores in the B. E. course. Two, three and three classroom hours a week during the first, second and third terms, respectively; and one laboratory period a week throughout the year.

2a. Elective in Mathematical Physics. This course is open to those who have taken 2, and aims to carry out and complete the mathematical discussion of some parts of the subject. A good knowledge of calculus is required, and an elementary knowledge of differential equations. Some time is devoted to a further study of differential equations as applied to physical problems, and through lectures and assignments of reading the student is introduced to more advanced work.

Elective for juniors and seniors who have taken 2. Two hours a week throughout the year.

3. Astronomy. A short course in astronomy is also given. This course is general and descriptive in character, including some reference to the more elementary mechanical aspects of the subject.

Required of juniors in the A. B. and B. S. courses, and open as an elective to the juniors in the Ph. B. course. Three hours a week during the second term.

4. Spherical Trigonometry and Astronomy. This course differs from the preceding in that it begins with the study of spherical trigonometry as applied to some of the problems of practical astronomy. The course is less descriptive and more mathematical than 3.

Required of juniors in the general engineering course, Option A, and in the sanitary engineering course. Three hours a week during the third term.

5. **Honors.** Candidates for special honors must have taken the elective in mathematical physics (2a) and are required to complete a special course of assigned work and reading, extending throughout the senior year, and to submit theses.

Chemistry

PROFESSOR ELLERY AND MR. EASTMAN

The object of instruction in this department is to develop power of accurate observation, and logical reasoning, and habits of careful work. Students who are planning special courses in chemistry, medicine, biology, geology, or other branches of natural science, will find the courses of great value. The laboratory facilities are convenient, the apparatus and chemicals are the best, and the chemical library contains recent books on various branches of the science.

1. **General Chemistry.** The course includes an exhaustive study of the non-metals and their compounds, together with the fundamental laws and theories of chemistry, a special study of the common metals, and a brief introduction to organic chemistry. Laboratory practice in the fall and winter terms is strictly quantitative, and in the Spring term includes simpler methods of qualitative analysis, involving the recognition of single metals and acid radicals in solution.

Required of sophomores in the B. E. course. Two recitations and one laboratory period weekly during the fall term; three recitations and one laboratory period weekly during the winter and spring terms.

1a. **General Chemistry.** This course is similar to course 1, in that it includes the study of metals and non-metals, theories and laws, but analytical work in the laboratory is limited to recognition of acid radicals in solution.

Required of freshmen in the B. S. course; and of sophomores in the Ph. B. course. Elective for juniors and seniors in the A. B. course. Two recitations and one laboratory period weekly throughout the year.

2. Descriptive Chemistry. This course covers a more exhaustive study of the metals than course 1, and acquaints the student with some of the applications of chemistry to engineering problems. The laboratory work comprises systematic examination of complex mixtures, particularly of those materials which are of especial interest to engineers.

Required of juniors in the B. E. course. Two recitations and two laboratory periods weekly during the fall term.

2a. Qualitative Analysis. A study of the reactions of bases and acids in solution, a course in blowpipe analysis, a systematic examination of complex solutions of metals and acids, and of complex solids.

Required of sophomores in the B. S. course. Elective for juniors and seniors in the Ph. B. course, and for seniors in the A. B. course who have had course 1a. Three laboratory periods weekly throughout the year.

3. Quantitative Analysis. In this course the student becomes familiar with various gravimetric and volumetric methods of analysis.

Elective for juniors in the B. S. course, and for seniors in the Ph. B. course, who have had course 2a. Three hours weekly throughout the year.

4. Organic Chemistry. This course comprises analysis of organic compounds, the preparation of typical organic substances, and a thorough study of the principles and theories of organic chemistry.

Elective for seniors in the B. S. course, who have had course 3. Three hours a week throughout the year.

5. Sanitary Chemistry. This course includes a limited study of quantitative methods, a thorough course in water analysis, and a short course in milk analysis.

Required of seniors in the sanitary engineering course. Two hours a week during the fall and winter terms.

6. Honors. Students who have completed course 3, and whose grades in all the work of the department meet the require-

ments, are eligible to honors in the subject of chemistry. Such students are required to do some original work and to submit a thesis on the results of their investigations.

Biology and Geology

PROFESSOR STOLLER

1. **General Biology.** This course is intended to give the student a knowledge of living plants and animals, to afford mental training in the study of nature, and to give the student a grasp of the broader facts and principles of biological science in their general philosophical values. Recitations and laboratory work.

Required of sophomores in the B. S. course, three hours weekly throughout the year, and of juniors in the Ph. B. course during the first two terms.

2. **Animal Morphology.** This course is adapted for students who wish a somewhat advanced knowledge and training in biology, especially as a preparation for teaching or for the medical profession. The work is mainly in the line of comparative anatomy, and includes the dissection of several vertebrate types in detail. Some time is given to elementary histology and embryology, involving the technique of section-cutting, etc. The course includes the reading of texts in general zoology and embryology.

Effective for seniors in the A. B., Ph. B. and B. S. courses. Three hours (six hours of laboratory work) weekly throughout the year.

3. **Principles of Zoology.** The aim of this course is to use the data of zoology for their worth as contributing to liberal culture. The more general facts and principles of animal structure, function and development are reviewed and considered in their relation to the study of man. The scientific evidences of organic evolution and the theories of evolution of various authors are considered. Lectures.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. General Bacteriology. This is a descriptive course treating of bacteria as a group of organisms and especially of the applications of bacteriology in sanitation. Demonstrations of microscopic preparations and of culture methods in the examination of water and milk are given. Recitations and lectures, with demonstrations.

Required of seniors in the sanitary engineering course and in option A of the general engineering course. Two hours weekly during the second term.

5. Laboratory Bacteriology. A brief course in laboratory bacteriology including the technique of culture methods, with special reference to the sanitary analysis of water, milk and soils.

Elective, under conditions, for seniors in the B. S. course. Three hours weekly during third term.

6. General Geology. This course is intended to afford a general knowledge of the science as a branch of liberal culture. The subject is abundantly illustrated by material from local sources. One field excursion required.

Required of juniors in the A. B. and B. S. courses; elective in the Ph. B. course. Three hours weekly during the first term.

7. Mineralogy and Geology. This course consists largely of laboratory and field work. It begins with the determination of common minerals and rocks. Structural and historical geology, as illustrated by the formations of the Mohawk valley and the Helderberg region, are then taken up.

Elective, under conditions, for seniors in the A. B. and B. S. courses and for those in the Ph. B. course who have taken 6. Three hours (six hours laboratory and field work) throughout the year.

8. Economic Geology. In this course, after a brief study of the principles of dynamic and structural geology, the work is related to the occurrence and distribution in the United States of building stones, mineral ores, coal and other economic products. Recitations, lectures and some laboratory work.

Required of seniors in the B. E. courses, general and sanitary divisions. Two hours weekly during the first term.

9. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Physiology and Physical Training

DR. MCCOMBER

Human anatomy, physiology, hygiene and physical training are required in all courses. In the freshman year the work consists of recitations and lectures, demonstrated by means of the microscope, the manikin and the human skeleton. An attempt is made to give a practical course covering the essential facts of the subject with the idea of arousing in every student a genuine self interest, of developing a wholesome self respect without overwhelming him with the mass of details that must be considered in a close study of anatomy.

During the fall term of the sophomore year a course in hygiene is given designed to acquaint the student with practical laws concerning the preservation of health and to impress upon his mind the dependence of health upon the consistent observance of such laws. Knowledge is of little value unless it find some application. Lectures on first aid to the injured, bacteriology, contagious and infectious diseases and social purity form a part of the course.

It is the aim of the department to give the student such a training in the methods of physical education that he may have a comprehensive knowledge of the subject, and to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Work in the gymnasium is required of freshmen only, but the organization of voluntary classes makes it possible for all to secure the advantages of systematic exercise. The course in the gymnasium is so arranged as to give a knowledge of the different kinds of apparatus pertaining to physical training. Commencing with light work, consisting of free gymnastics, club, dumb-bell and wand exercises, the course leads through a graded series, involving heavier work as the student becomes fitted for it.

Freshmen are required to pass an examination in gymnastics

at the end of the winter term, credit being based upon actual proficiency in the various exercises as indicated by such examination.

A physical examination of new students is made at the beginning of the year and corrective exercises are prescribed for the remedy of physical defects. Charts of the physical measurements showing the comparison of the individual with the normal development and hand books containing much valuable hygienic data are furnished upon payment of a small fee. All candidates for college teams are required to pass a satisfactory physical examination before they are allowed to compete in athletic contests.

It is the policy of the department, so far as the equipment will permit, to influence the entire student body to take an active part in athletic sports and gymnastics and not to cater to the exceptional athlete to the exclusion of those who are physically less perfectly equipped.

Special Lectures

It is the policy of the college to provide its students with the advantages of frequent lectures by specialists in the various departments of knowledge.

In endowing the Ichabod Spencer Professorship in Philosophy, Mrs. Katherine Spencer Leavitt set aside the sum of \$25,000 to establish a lectureship in memory of her father, the Reverend Ichabod Spencer, D.D., of the class of 1823, to be known as the Ichabod Spencer Lectureship in Psychology. The first series of lectures upon this foundation was given during the winter of 1911 by James R. Angell, A.M., professor and head of the department of psychology in the University of Chicago.

Library

The library occupies Nott Memorial Hall. It contains forty thousand volumes, and includes the engineering and scientific library of the late Professor Gillespie, the collection of mathematical works made by the late John Patterson, of Albany; the library of the late Hon. Henry J. Cullen, of the class of 1860, and the library of ancient and classical language and literature of the late Professor Tayler Lewis. The income from a bequest

of five thousand dollars left by the late Lemon Thomson, Esq., of Albany, of the class of 1850, is devoted to the purchase of books on American subjects, especially history and political science. An alcove, known as the Thomson Alcove, is reserved for these books. By the will of the late Rev. Oscar Blakeslee Hitchcock, of the class of 1852, a bequest of upwards of thirty thousand dollars was left to the college for the purchase of books, manuscripts, etc. A most important accession lately acquired is the Croes Engineering Library, the gift of Mr. Edgar Beach Van Winkle of the class of 1860. The library is classified according to the Dewey decimal system and a dictionary card catalogue, on the Dewey plan, is now being prepared.

One hundred and fifteen periodicals and the transactions of many learned societies are received.

Library Rules

Hours: 8-1; 2-6; 7:30-9 from Monday to Friday. 8-1; 7:30-9 on Saturday.

The library will be closed on Sundays and legal holidays.

The library will be open during vacation at hours to be announced.

Loan of books: Reference, Cullen and valuable books are not to be loaned.

Reserved books may be loaned over night, i. e., from 9 p. m. to 8 a. m. There will be a fine of \$1.00 per day or part of a day for each reserved book overdue.

Periodicals are regarded as reference books.

All other books may be loaned, not more than two at a time, for a period of two weeks, and may be once renewed, unless called for. A fine of ten cents per day will be charged for all books overdue, and all library privileges will be withdrawn until the book is returned and the fine paid.

The Natural History Museum

PROFESSOR STOLLER, CURATOR

Dr. D. S. Martin, Honorary Curator of the Wheatley Collection of Minerals.

The collections have recently been transferred to the third floor of Nott Memorial Hall. The opportunity has been used for

the re-inspection of all the material and for placing the collections in order with reference to their preservation and their educational use.

The Wheatley collection of minerals, presented to the college in 1858, by E. C. Delavan, Esq., contains 4,000 specimens, many of which represent the more valuable forms. This collection has recently been carefully inspected by Dr. D. S. Martin of New York city. All of the specimens have been re-identified and the entire collection has been re-arranged and placed in order for exhibition and for study. It has also been enriched by additional specimens, some of them from the personal collection of Dr. Martin, now presented to the college, and others from the Brooks collection, a gift to the college from Mr. Alfred H. Brooks of the United States geological survey, in memory of his father, a graduate of the college, by whom the collection was made.

In geology there is a general collection of rocks and minerals, and a considerable collection of paleozoic and mesozoic fossils. The collections made by the geological department under the direction of Professor C. S. Prosser so increased the museum that there is plenty of material now available, especially for the careful study of the paleozoic rocks and fossils of the New York formations. These have recently been examined, re-arranged and placed in cases for exhibition by Dr. Martin.

In zoology the collection of mounted birds numbers 311 specimens, representing 161 species of the bird fauna of the eastern United States. These have recently been carefully inspected, and re-labelled. A considerable number of specimens of Porto Rican birds, collected and presented to the college by Mr. Byron W. Reed of the class of 1906, and mounted by Mr. John R. Nowell of the class of 1905, have been added. Of mammals there is a collection of 57 skins, the gift of the U. S. National Museum, and a number of skulls, skeletons and mounted specimens. Fishes, amphibia and reptiles, especially of the local fauna, are represented by specimens in alcohol. In the department of invertebrates the collections of marine animals made by Dr. Harrison E. Webster are extensive, including sponges, corals, worms, crustacea and mollusks, the total number of species represented

being over 5,000. The Wheatley collection of shells, presented by E. C. Delavan, Esq., consists of 8,000 specimens.

The botanical collections include a nearly complete set of local flowering plants, the work of Professor Jonathan Pearson. To this there has since been added a complete set of the ferns and fern allies of Schenectady county. The flora of the United States is further represented by collections from Virginia, the Red River region of the southwest, and those made by Dr. Nevins in Alabama. The lower cryptogams are represented by a valuable collection of 2,300 specimens of fungi, the gift of Mr. J. B. Ellis, of the class of 1851. The herbarium also includes a considerable number of foreign plants, including representative collections from Germany, Spain, Asia Minor and England, as well as some specimens from Iceland, Norway, France and Switzerland. They have been sorted and distributed in a single series following the latest accepted sequence; that of Engler and Prantl's *Natürliche Pflanzenfamilien*, making the entire collection of some 8,000 or 10,000 specimens readily accessible for reference and study.

The museum is open to the public on Wednesday afternoon and Saturday morning. Visitors may be admitted at other times by making application to the college librarian.

CURRICULA OF ACADEMIC COURSES

The numeral after a subject refers to the course as described in the departmental statement; the number in parenthesis refers to the page where the statement is given.

Course A leading to Degree of A.B.

Freshman Year

First Term

Greek I.....	(43).....	4 hours
Latin I.....	(44).....	4 hours
French I.....	(49).....	3 hours
Rhetoric I.....	(50).....	2 hours
Mathematics I.....	(59).....	4 hours
Physiology.....	(66).....	1 hour
Greek Prose Composition		
Latin Prose Composition		
		Total 18 hours

Second Term

Greek I.....	(43).....	4 hours
Latin I.....	(44).....	4 hours
French I.....	(49).....	3 hours
Rhetoric I.....	(50).....	2 hours
Mathematics 2.....	(59).....	4 hours
Physiology.....	(66).....	1 hour
Gymnastics.....	(66).....	1 hour
Greek Prose Composition		
Latin Prose Composition		
		Total 19 hours

Third Term

Greek I.....	(43).....	4 hours
Latin I.....	(44).....	4 hours
French I.....	(49).....	3 hours
Rhetoric I.....	(50).....	2 hours
Mathematics 3.....	(59).....	4 hours
Physiology.....	(66).....	1 hour
Gymnastics.....	(66).....	1 hour
Greek Prose Composition		
Latin Prose Composition		
		Total 19 hours

Sophomore Year

First Term

Greek 3.....	(43).....	3 hours
Latin 2.....	(44).....	3 hours
German 1a.....	(46).....	3 hours
English 3.....	(51).....	2 hours
History 1.....	(54).....	2 hours
or		
Mathematics 4a.....	(60).....	2 hours
Physics 1.....	(60).....	3 hours
Hygiene.....	(66).....	1 hour

Total 17 hours

Second Term

Greek 3.....	(43).....	3 hours
Latin 2.....	(44).....	3 hours
German 1a.....	(46).....	3 hours
English 3.....	(51).....	2 hours
Rhetoric 8.....	(53).....	1 hour
History 1.....	(54).....	2 hours
or		
Mathematics 4a.....	(60).....	2 hours
Physics 1.....	(60).....	3 hours

Total 17 hours

Third Term

Greek 3.....	(43).....	3 hours
Latin 2.....	(44).....	3 hours
German 1a.....	(46).....	3 hours
English 3.....	(51).....	2 hours
Rhetoric 8.....	(53).....	1 hour
History 1.....	(54).....	2 hours
or		
Mathematics 4a.....	(60).....	2 hours
Physics 1.....	(60).....	3 hours

Total 17 hours

Junior Year

First Term

English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour

Logic 1.....	(56).....	3 hours
Geology 6.....	(65).....	3 hours
Electives.....	(85).....	<u>7 hours</u>

Total 16 hours

Second Term

English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Psychology 2.....	(56).....	3 hours
Astronomy 3.....	(61).....	3 hours
Electives.....	(85).....	<u>7 hours</u>

Total 16 hours

Third Term

English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Ethics 3.....	(56).....	3 hours
Evolution 3.....	(65).....	3 hours
Electives.....	(85).....	<u>7 hours</u>

Total 16 hours

*Senior Year**First Term*

Rhetoric 10.....	(53).....	1 hour
Economics 1.....	(58).....	3 hours
Electives.....	(85).....	<u>13 hours</u>

Total 17 hours

Second Term

Rhetoric 10.....	(53).....	1 hour
Economics 2.....	(58).....	3 hours
Electives.....	(85).....	<u>13 hours</u>

Total 17 hours

Third Term

Rhetoric 10.....	(53).....	1 hour
Economics 2.....	(58).....	3 hours
Electives.....	(85).....	<u>13 hours</u>

Total 17 hours

Course B leading to Degree of A.B.

Freshman Year

First Term

Greek 2.....	(43).....	4 hours
Latin 1.....	(44).....	4 hours
French 1.....	(49).....	3 hours
or		
German 1.....	(46).....	3 hours
Rhetoric 1.....	(50).....	2 hours
Mathematics 1.....	(59).....	4 hours
Physiology.....	(66).....	1 hour
Greek Prose Composition		
Latin Prose Composition		

 Total 18 hours

Second Term

Greek 2.....	(43).....	4 hours
Latin 1.....	(44).....	4 hours
French 1.....	(49).....	3 hours
or		
German 1.....	(46).....	3 hours
Rhetoric 1.....	(50).....	1 hour
Mathematics 2.....	(59).....	4 hours
Physiology.....	(66).....	1 hour
Gymnastics.....	(66).....	1 hour
Greek Prose Composition		
Latin Prose Composition		

 Total 18 hours

Third Term

Greek 2.....	(43).....	4 hours
Latin 1.....	(44).....	4 hours
French 1.....	(49).....	3 hours
or		
German 1.....	(46).....	3 hours
Rhetoric 1.....	(50).....	2 hours
Mathematics 3.....	(59).....	4 hours
Physiology.....	(66).....	1 hour
Gymnastics.....	(66).....	1 hour
Greek Prose Composition		
Latin Prose Composition		

 Total 19 hours

Sophomore Year

First Term

Greek 4	(43).....	3 hours
Latin 2	(44).....	3 hours
French 2a	(49).....	3 hours
or		
German 2	(46).....	3 hours
English 3	(51).....	2 hours
History 1	(54).....	2 hours
or		
Mathematics 4a	(60).....	2 hours
Physics 1	(60).....	3 hours
Hygiene	(66).....	1 hour

Total 17 hours

Second Term

Greek 4	(43).....	3 hours
Latin 2	(44).....	3 hours
French 2a	(49).....	3 hours
or		
German 2	(46).....	3 hours
English 3	(51).....	2 hours
Rhetoric 8	(53).....	1 hour
History 1	(54).....	2 hours
or		
Mathematics 4a	(60).....	2 hours
Physics 1	(60).....	3 hours

Total 17 hours

Third Term

Greek 4	(43).....	3 hours
Latin 2	(44).....	3 hours
French 2a	(49).....	3 hours
or		
German 2	(46).....	3 hours
English 3	(51).....	2 hours
Rhetoric 8	(53).....	1 hour
History 1	(54).....	2 hours
or		
Mathematics 4a	(60).....	2 hours
Physics 1	(60).....	3 hours

Total 17 hours

Junior Year*First Term*

Greek 6.....	(43).....	2 hours
English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Logic 1.....	(56).....	3 hours
Geology 6.....	(65).....	3 hours
Electives.....	(85).....	<u>5 hours</u>

Total 16 hours

Second Term

Greek 6.....	(43).....	2 hours
English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Psychology 2.....	(56).....	3 hours
Astronomy 3.....	(61).....	3 hours
Electives.....	(85).....	<u>5 hours</u>

Total 16 hours

Third Term

Greek 6.....	(43).....	2 hours
English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Ethics 3.....	(56).....	3 hours
Evolution 3.....	(65).....	3 hours
Electives.....	(85).....	<u>5 hours</u>

Total 16 hours

Senior Year*First Term*

Greek 8.....	(44).....	2 hours
Rhetoric 10.....	(53).....	1 hour
Economics 1.....	(58).....	3 hours
Electives.....	(85).....	<u>11 hours</u>

Total 17 hours

Second Term

Greek 8.....	(44).....	2 hours
Rhetoric 10.....	(53).....	1 hour
Economics 2.....	(58).....	3 hours
Electives.....	(85).....	<u>11 hours</u>

Total 17 hours

Third Term

Greek 8.....(44).....	2 hours
Rhetoric 10.....(53).....	1 hour
Economics 2.....(58).....	3 hours
Electives.....(85).....	<u>11 hours</u>
Total	17 hours

Course leading to Degree of Ph.B.**Freshman Year***First Term*

Latin 1.....(44).....	4 hours
German 2 or 1.....(46).....	3 hours
French 1 or 2.....(49).....	3 hours
Rhetoric 1.....(50).....	2 hours
Mathematics 1.....(59).....	4 hours
Physiology.....(66).....	1 hour
Latin Prose Composition	

Total 17 hours*Second Term*

Latin 1.....(44).....	4 hours
German 2 or 1.....(46).....	3 hours
French 1 or 2.....(49).....	3 hours
Rhetoric 1.....(50).....	2 hours
Mathematics 2.....(59).....	4 hours
Physiology.....(66).....	1 hour
Gymnastics.....(66).....	1 hour
Latin Prose Composition	

Total 18 hours*Third Term*

Latin 1.....(44).....	4 hours
German 2 or 1.....(46).....	3 hours
French 1 or 2.....(49).....	3 hours
Rhetoric 1.....(50).....	2 hours
Mathematics 3.....(59).....	4 hours
Physiology.....(66).....	1 hour
Gymnastics.....(66).....	<u>1 hour</u>

Total 18 hours

Sophomore Year

First Term

Latin 2.....	(44).....	3 hours
German 2.....	(46).....	3 hours
or.		
French 2a.....	(49).....	3 hours
English 3.....	(51).....	2 hours
History 1.....	(54).....	2 hours
or		
Mathematics 4a.....	(60).....	2 hours
Physics 1.....	(60).....	3 hours
Chemistry 1a.....	(63).....	3 hours
Hygiene.....	(66).....	1 hour

Total 17 hours

Second Term

Latin 2.....	(44).....	3 hours
German 2.....	(46).....	3 hours
or		
French 2a.....	(49).....	3 hours
English 3.....	(51).....	2 hours
Rhetoric 8.....	(53).....	1 hour
History 1.....	(54).....	2 hours
or		
Mathematics 4a.....	(60).....	2 hours
Physics 1.....	(60).....	3 hours
Chemistry 1a.....	(63).....	3 hours

Total 17 hours

Third Term

Latin 2.....	(44).....	3 hours
German 2.....	(46).....	3 hours
or		
French 2a.....	(49).....	3 hours
English 3.....	(51).....	2 hours
Rhetoric 8.....	(53).....	1 hour
History 1.....	(54).....	2 hours
or		
Mathematics 4a.....	(60).....	2 hours
Physics 1.....	(60).....	3 hours
Chemistry 1a.....	(63).....	3 hours

Total 17 hours

Junior Year*First Term*

English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Logic 1.....	(56).....	3 hours
Biology 1.....	(64).....	3 hours
Electives.....	(85).....	<u>7 hours</u>

Total 16 hours

Second Term

English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Psychology 2.....	(56).....	3 hours
Biology 1.....	(64).....	3 hours
Electives.....	(85).....	<u>7 hours</u>

Total 16 hours

Third Term

English 4.....	(52).....	2 hours
Rhetoric 9.....	(53).....	1 hour
Ethics 3.....	(56).....	3 hours
Biology 3.....	(65).....	3 hours
Electives.....	(85).....	<u>7 hours</u>

Total 16 hours

Senior Year*First Term*

Rhetoric 10.....	(53).....	1 hour
Economics 1.....	(58).....	3 hours
Electives.....	(85).....	<u>13 hours</u>

Total 17 hours

Second Term

Rhetoric 10.....	(53).....	1 hour
Economics 2.....	(58).....	3 hours
Electives.....	(85).....	<u>13 hours</u>

Total 17 hours

Third Term

Rhetoric 10.....	(53).....	1 hour
Economics 2.....	(58).....	3 hours
Electives.....	(85).....	<u>13 hours</u>

Total 17 hours

Course leading to Degree of B.S.

Freshman Year

First Term

German 2 or 1.....	(46).....	3 hours
French 1 or 2.....	(49).....	3 hours
Rhetoric 1.....	(50).....	2 hours
Mathematics 2a.....	(59).....	5 hours
Chemistry 1a.....	(63).....	3 hours
Physiology.....	(66).....	1 hour

Total 17 hours

Second Term

German 2 or 1.....	(46).....	3 hours
French 1 or 2.....	(49).....	3 hours
Rhetoric 1.....	(50).....	2 hours
Mathematics 3a and 4.....	(59).....	5 hours
Chemistry 1a.....	(63).....	3 hours
Physiology.....	(66).....	1 hour
Gymnastics.....	(66).....	1 hour

Total 18 hours

Third Term

German 2 or 1.....	(46).....	3 hours
French 1 or 2.....	(49).....	3 hours
Rhetoric 1.....	(50).....	2 hours
Mathematics 4.....	(59).....	5 hours
Chemistry 1a.....	(63).....	3 hours
Physiology.....	(66).....	1 hour
Gymnastics.....	(66).....	1 hour

Total 18 hours

Sophomore Year

First Term

German 2.....	(46).....	3 hours
or		
French 2a.....	(49).....	3 hours
English 3.....	(51).....	2 hours
History 1.....	(54).....	2 hours
or		
Mathematics 5.....	(60).....	2 hours

Physics 1	(60)	3 hours
Chemistry 2a	(63)	3 hours
Biology 1	(64)	3 hours
Hygiene	(66)	1 hour
		<u>Total 17 hours</u>

Second Term

German 2	(46)	3 hours
or		
French 2a	(49)	3 hours
English 3	(51)	2 hours
Rhetoric 8	(53)	1 hour
History 1	(54)	2 hours
or		
Mathematics 5	(60)	2 hours
Physics 1	(60)	3 hours
Chemistry 2a	(63)	3 hours
Biology 1	(64)	3 hours
		<u>Total 17 hours</u>

Third Term

German 2	(46)	3 hours
or		
French 2a	(49)	3 hours
English 3	(51)	2 hours
Rhetoric 8	(53)	1 hour
History 1	(54)	2 hours
or		
Mathematics 5	(60)	2 hours
Physics 1	(60)	3 hours
Chemistry 2a	(63)	3 hours
Biology 1	(64)	3 hours
		<u>Total 17 hours</u>

*Junior Year**First Term*

English 4	(52)	2 hours
Rhetoric 9	(53)	1 hour
Logic 1	(56)	3 hours
Geology 6	(65)	3 hours
Electives	(85)	7 hours
		<u>Total 16 hours</u>

Second Term

English 4.....(52).....	2 hours
Rhetoric 9.....(53).....	1 hour
Psychology 2.....(56).....	3 hours
Astronomy 3.....(61).....	3 hours
Electives.....(85).....	<u>7 hours</u>

Total 16 hours

Third Term

English 4.....(52).....	2 hours
Rhetoric 9.....(53).....	1 hour
Ethics 3.....(56).....	3 hours
Evolution 3.....(65).....	3 hours
Electives.....(85).....	<u>7 hours</u>

Total 16 hours

*Senior Year**First Term*

Rhetoric 10.....(53).....	1 hour
Economics 1.....(58).....	1 hour
Electives.....(85).....	<u>13 hours</u>

Total 15 hours

Second Term

Rhetoric 10.....(53).....	1 hour
Economics 2.....(58).....	1 hour
Electives.....(85).....	<u>13 hours</u>

Total 15 hours

Third Term

Rhetoric 10.....(53).....	1 hour
Economics 2.....(58).....	1 hour
Electives.....(85).....	<u>13 hours</u>

Total 15 hours

SCHEDULE OF REQUIRED STUDIES IN THE ACADEMIC COURSES

Freshman Year

Elementary German 1, 3 hours.....	T., Th., S., 8-9
Elementary German 2, 3 hours.....	T., Th., S., 9-10
Elementary German 3, 3 hours.....	M., W., F., 9-10
Elementary German a, 3 hours.....	M., W., F., 8-9
Intermediate German 1, 3 hours.....	M., W., F., 8-9
Intermediate German 2, 3 hours.....	M., W., F., 9-10
Intermediate German 3, 3 hours.....	T., Th., S., 8-9
Elementary French 1, 3 hours.....	T., Th., S., 8-9
Elementary French 2, 3 hours.....	T., Th., S., 9-10
Elementary French 3, 3 hours.....	M., W., F., 9-10
Elementary French 4, 3 hours.....	M., W., F., 8-9
Elementary French a, 3 hours.....	M., W., F., 9-10
Intermediate French, 3 hours.....	T., Th. S., 9-10
Greek (course A), 4 hours.....	M., T., Th., S., 10-11
Greek (course B), 4 hours.....	M., T., Th., S., 9-10
Latin, 4 hours.....	W., F., 10-11; T., Th., 11-12
Mathematics (B. S.), 5 hours	M., T., W., Th., F., 10-11
Mathematics (A. B., Ph. B.), 4 hours.....	M., W., F., S., 11-12
Rhetoric (A. B., Ph.B.), 2 hours	T., Th., 1:30-2:30
Rhetoric (B. S.), 2 hours	M., W., 11-12
General Chemistry, 3 hours	T., Th., 11-12; lab., F., 1:30-3:30
Physiology, 1 hour.....	W., 1:30-2:30
Gymnastics (second and third terms).....	T., Th., 2:30-3:30

Sophomore Year

Greek (course B), 3 hours	M., W., F., 8-9
Greek (course A) 3 hours.....	T., Th., S., 11-12
Elementary German a, 3 hours.....	M., W., F., 8-9
Hygiene, term 1, 1 hour.....	T., 8-9
Rhetoric, terms 2 and 3, 1 hour.....	T., 8-9
English, 2 hours.....	Th., S., 8-9
Physics, 3 hours.....	M., W., F., 11-12

Intermediate French 1, 3 hours.....	M., W., F., 10-11
Intermediate French 2, 3 hours.....	T., Th., S., 10-11
Junior French, 3 hours.....	M., W., F., 10-11
Intermediate German 1, 3 hours.....	M., W., F., 10-11
Intermediate German 2, 3 hours.....	T., Th., S., 10-11
Junior German, 3 hours.....	T., Th., S., 10-11
Latin, 3 hours.....	M., W., F., 9-10
General Chemistry, 3 hours.....	T., Th., 11-12; lab. F., 1:30-3:30
Qualitative Analysis, 3 hours.....	T., Th., 1:30-4:30
Biology, 3 hours.....	T., Th., 11-12; lab., M. or F., 1:30-3:30

Junior Year

Geology (term 1), 3 hours.....	T., Th., S., 8-9
Astronomy (term 2), 3 hours.....	T., Th., S., 8-9
Evolution (term 3), 3 hours.....	T., Th., S., 8-9
English, 2 hours	M., F., 9-10
Logic, Psychology and Ethics, 3 hours.....	M., W., F., 11-12
Biology, 3 hours.....	T., Th., 11-12; lab., M. or F., 1:30-3:30
Rhetoric, 1 hour.....	S., 11-12
Greek (course B), 2 hours.....	M., W., 1:30-2:30

Senior Year

Economics, 3 hours.....	T., Th., S., 8-9
Rhetoric, 1 hour.....	S., 10-11
Greek (course B), 2 hours.....	W., F., 11-12

SCHEDULE OF ELECTIVES FOR ALL COURSES

Two hours are required of sophomores.

A total of seven hours is required of juniors.

A total of thirteen hours is required of seniors.

The number of hours per week and the times of meeting are indicated after each subject.

Students may choose any subjects not conflicting. Subjects that conflict have been placed in the same group.

Sophomore Group

For limiting conditions, see statements of respective departments

History, 2 hours.....	T., Th., 9-10
Analytic Geometry ^{1 2} , 2 hours.....	T., Th., 9-10
Differential Calculus ³ , 2 hours	W., S., 9-10

Junior Groups

For limiting conditions, see statements of respective departments

Group I

American History, 3 hours.....	M., W., F., 8-9
--------------------------------	-----------------

Group II

Latin ^{1 2} , 2 hours.....	T., Th., 9-10
-------------------------------------	---------------

Group III

Argumentation, 2 hours.....	W., S., 9-10
Differential Calculus ³ , 2 hours	W., S., 9-10

Group IV

French, 3 hours.....	M., W., F., 10-11
Anglo Saxon, 2 hours.....	W., F., 10-11

Group V

Spanish, 3 hours.....	M., W., F., 3:30-4:30
Field Geology ⁴ , 3 hours.....	W., 1:30-4:30
Shakespeare, 1 hour.....	M., 1:30-2:30

¹For A. B. Course

²For Ph. B. Course

³For B. S. Course

⁴See statement of course

General Chemistry¹, 3 hours.....T., Th., 11-12; F., 1:30-3:30
 Quantitative Analysis², 3 hours.....M., W., 1:30-4:30
 Hebrew, 3 hours.....M., W., F., 2:30-3:30

Group VI

Qualitative Analysis³, 3 hours.....T., Th., 1:30-4:30
 Greek¹, 2 hours.....T., Th., 1:30-2:30
 Mathematical Physics, 2 hours.....T., Th., 3:30-4:30
 Physics Laboratory, 2 hours.....T., Th., 1:30-3:30

Group VII

Integral Calculus³, 2 hours.....T., Th., 11-12

Group VIII

German, 3 hours.....T., Th., S., 10-11

Group IX

General Geology (term 1), 3 hours.....T., Th., S., 8-9
 Astronomy (term 2), 3 hours.....T., Th., S., 8-9
 Evolution (term 3), 3 hours.....T., Th., S., 8-9

Senior Groups

For limiting conditions, see statements of respective departments

Group I

Advanced Geology, 3 hours.....M., W., F., 9-11
 European History, 3 hours.....M., W., F., 9-10
 Greek¹, 2 hours.....M., 11-12; W., 10-11
 Differential Equations, 2 hours.....M., F., 9-10
 Sociology, 3 hours.....M., W., F., 10-11

Group II

Latin^{1 2}, 2 hours.....T., Th., 10-11
 Comparative Politics and International Law, 3 h. T., Th., S., 9-10
 German, 3 hours.....T., Th., S., 9-10

¹For A. B. Course

²For Ph. B. Course

³For B. S. Course

Group III

History of Philosophy, 3 hours.....T., Th., S., 11-12
 General Chemistry¹, 3 hours.....T., Th., 11-12; F., 1:30-3:30
 Integral Calculus^{1,2}, 2 hours.....T., Th., 11-12

Group IV

Spanish⁴, 3 hours.....M., W., F., 3:30-4:30
 History and Philosophy of Education, 2 hours, M., W., 3:30-4:30
 French, 3 hours.....M., W., F., 2:30-3:30
 General Chemistry¹, 3 hours.....T., Th., 11-12; F., 1:30-3:30
 Shakespeare, 1 hour.....M., 1:30-2:30
 Quantitative Analysis^{2,3}, 3 hours.....M., W., 1:30-4:30
 Advanced Argumentation, 2 hours.....W., 1:30-3:30
 Hebrew⁵, 3 hours.....M., W., F., 2:30-3:30
 Hebrew, 3 hours.....M., W., F., 3:30-4:30

Group V

Qualitative Analysis^{1,2}, 3 hours.....T., Th., 1:30-4:30
 Mathematical Physics, 2 hours.....T., Th., 3:30-4:30
 Organic Chemistry³, 3 hours.....T., Th., 1:30-4:30
 Physics Laboratory, 2 hours.....T., Th., 1:30-3:30
 English Poetry, 2 hours.....T., Th., 1:30-2:30
 Spanish, 2 hours.....T., Th., 2:30-3:30

Group VI

Advanced Psychology (first term), 3 hours.....M., W., F., 8-9
 Advanced Ethics (second term), 3 hours.....M., W., F., 8-9
 Evolution of Religion (third term), 3 hours.....M., W., F., 8-9
 History of English Language, 3 hours.....M., W., F., 8-9

1For A. B. Course 2For Ph. B. Course 3For B. S. Course

4For those who have not had Spanish in the Junior year

5For those who have not had Hebrew in the Junior year

THE ENGINEERING SCHOOL

Historical. When Union College was chartered, in February, 1795, the only American colleges west of the Hudson River were William and Mary, Princeton, Hampden-Sidney, Rutgers and Dickinson. These, as well as the New England colleges, were all denominational; Union was the first strictly non-sectarian American college, and its name was inspired in part by this novel characteristic. The first full professorship in natural science in an American college was founded at Union and it is a matter of special scientific interest that Prof. F. R. Hassler was called from this chair in 1811 to establish the United States Coast Survey.

The engineering school of Union College is one of the oldest technical schools of the country. Founded in 1845 with Prof. William M. Gillespie at its head, it at once took high rank, and for many years was one of the few engineering schools in America. From the first it appears to have been the evident policy of the school to adapt the thorough training of L'Ecole des Ponts et Chaussées, of Paris, France, where Prof. Gillespie had finished his technical education, to the demands of professional practice in a vigorous new country, where resources and opportunities were abundant, and where capital and professional precedent were wanting. From the characteristic tendencies impressed on the school at its foundation it has never departed, although it has endeavored to keep pace with the development in American technical education and with the increased demands on professional training. For many years civil engineering only was taught; then, as the principles of modern sanitary science came to be better understood and the possibilities of their further development and their utilization as life-saving agencies were discerned, a course in sanitary engineering was established; and more recently a course in electrical engineering was added.

During its whole history the school of engineering at Union has stood for broad, fundamental training rather than for narrow specialization and during recent years, since its advanced entrance requirements have made room in the course, increased time and attention have been given to culture studies and to a larger proportion of academic training.

Local Advantages. Schenectady is a peculiarly favorable location for an engineering school. The city is on the Mohawk River,

and is intersected by several steam railroads, a number of inter-urban trolley lines and the Erie Canal, furnishing many bridges and other engineering works. At Schenectady are also located the works of the General Electric Company and of the American Locomotive Company, each an extensive and leading industry in its respective line. Among other interesting engineering features, may be mentioned the city grade-crossings improvement recently completed at a cost of a million dollars, and the city waterworks, which contain in their outfit a system of ground-water wells and a recently installed set of electrically-driven multiple-stage centrifugal pumps, of twenty million gallons daily capacity. The neighboring cities of Albany, Troy and Cohoes, as well as the surrounding territory, offer numerous examples of good engineering and many features of value as aids in engineering training. Among these may be mentioned the scientific departments of the state government at Albany, comprising the state engineer's department, which includes also the new barge canal, the good roads division and the bureau for testing materials; the headquarters of the state water supply commission, which includes also the state river improvement work; the headquarters of the Public Service Commission for district No. 2; the state library, which is well supplied with technical and engineering works; the Albany city water filtration plant; at Troy, the Burden iron works and the Gurley engineering instrument manufactory; at Watervliet, the United States arsenal and gun factory; the water power developments and electric power transmission plants at Mechanicville, Spier Falls, Schaghticoke and Johnsonville; the hydraulic cement works at Glens Falls and at Howe's Cave; and the modern sewage disposal systems at Saratoga Springs, Ballston Spa and Scotia. The new barge canal will pass the Cohoes falls by a flight of locks and will pass Schenectady by a system of locks and dams, both permanent and movable, now under construction, which will canalize the Mohawk River, calling for extensive and interesting engineering operations. All these sources of aid are utilized in the work of the school.

Admission and Expenses. The general conditions governing admission to all the engineering courses are stated in detail on pages 30-41. Information regarding expenses, terms and vacations is given on pages 143 and 21.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean

Professor of History and Government

OLIN H. LANDRETH, A. M., C. E., Sc.D.
Professor of Civil Engineering

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Professor of Modern Languages

HORACE GRANT McKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

JAMES BOYD KENNEDY, PH. D.
Professor of Economics

GEORGE DWIGHT KELLOGG, PH. D.
Professor of the Latin Language and Literature

OLIN J. FERGUSON, M. E. E.
Associate Professor of Electrical Engineering

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

MORTON COLLINS STEWART, PH. D.
Assistant Professor of German

JAMES H. CUNNINGHAM, M. E. E.
Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

ALBERT S. EASTMAN, M. S.
Instructor in Chemistry

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

WALTER SCOTT HASTINGS, A. M.
Instructor in French

STANLEY PERKINS CHASE, PH. D.
Instructor in English

GILBERT ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

J. L. R. HAYDEN
Lecturer on Arc Lighting and Photometry and
Supervisor of Electr. Eng. Thesis Work

HUGO MUENSTERBERG, PH. D., M. D., LL. D., Litt. D.
Ichabod Spencer Lecturer on Psychology

COURSES OF STUDY

General Education and Technical Training. In the training of a young man for his professional work two distinct methods are open. One is to separate his professional work from his general educational training and to complete the latter before the former is commenced. This is the plan followed in the professional schools of theology, law and medicine. The other plan is, after the student has reached a certain point in his studies to have him carry forward at the same time his general education and his technical training. This plan is the one generally followed in engineering schools, as it has been found by engineering educators and professional engineers to yield better results in practice than the former plan. The point selected at which the technical training shall commence is the beginning of the college course, the time of which is divided between general studies and technical studies. In the Union College engineering courses the time allotted to these two divisions is about equal, though the two are carried on simultaneously, the general training being given, however, more time in the early part of the course and less in the latter part.

Undergraduate Courses. Four undergraduate courses of study in engineering are offered, three extending through four years and one extending through six years:—(1) A four-year course in general engineering, which is intended to give the basis of a broad engineering education, including the fundamental principles underlying the special branches of the profession; (2) A four-year course in sanitary engineering which differs from the general engineering course by substituting special work in sanitary subjects for some of the general engineering studies; and (3) a four-year course in electrical engineering, in which the last two years are devoted to essentially mechanical and electrical engineering subjects.

These three courses are identical during the first two years, the sanitary course differing slightly from the general during the last two years, while the electrical course in its last two years differs widely from the other courses. The degree of Bachelor of Engineering (B. E.) is given for the successful completion of any one of the above three courses.

A six-year course in general engineering is also offered comprising the above four-year course in general engineering, course (I), and the regular four-year Latin-scientific course of the academic department, with the subjects of the two courses properly interwoven during each term. The course thus offers a combined college and technical training with the subjects of the two properly correlated. The degrees of Bachelor of Engineering (B. E.) and of Bachelor of Philosophy (Ph. B.) are given on the satisfactory completion of this course.

Graduate Courses. In addition to the above undergraduate courses in engineering, three graduate courses and degrees are offered:

The degrees of Master of Civil Engineering (M. C. E.) and of Master of Electrical Engineering (M. E. E.) are given on the satisfactory completion of one-year graduate courses of study in civil engineering and in electrical engineering, respectively. The degree of Doctor of Philosophy (Ph. D.) is given to candidates who have received the master's degree, on the completion of an additional course of two years of graduate study in electrical science.

STUDIES OF THE FOUR COURSES

The following is an outline of those studies which in general are common to the three four-year courses in general, sanitary, and electrical engineering and to the six-year general engineering and Latin-scientific course. The studies which are peculiar to each are outlined under the separate departments.

Following the distinction between the two kinds of training above mentioned, the studies here outlined are arranged under the two heads of general studies and technical studies.

General Studies

Physics. The instruction in physics comprises a series of lectures on experimental physics, accompanied by classroom and laboratory work. Physical laboratory work is required of all engineering students. See also pages 60-62.

Chemistry. General chemistry is taught by lectures, recitations and laboratory work during the freshman and sophomore years and laboratory work in qualitative analysis is continued through the first term of the junior year. Sanitary engineering students, in addition to the above, take chemical laboratory work during the first and second terms of the senior year. See also pages 62-64.

Astronomy. The instruction in astronomy includes physical astronomy, spherical astronomy and the theory of astronomical instruments. These studies are preparatory to the work in astronomical surveying and geodesy given in the general engineering course. In the electrical engineering course the work is confined to descriptive astronomy.

Biology. Physiology is a required study in each of the three engineering courses. Structural botany is given in the general and sanitary courses, and bacteriology is given in the sanitary course. Structural botany includes the microscopic study of the vegetable cell, the tissues and the tissue-system of the higher plants with special reference to the use of woods in the constructive arts. In bacteriology some of the common bacteria of water, air and soil are studied according to the methods of modern bacteriological work. The accompanying lectures treat of bacteria in regard to their place and role in nature and their relations to sanitary science. See also pages 64-66.

Geology (not required in the electrical engineering course). This work comprises a course in economic geology, which includes the general principles of geology and a discussion of the occurrence and distribution of minerals and mineral materials for construction in the United States. See also pages 64-66.

English. The instruction in English aims at a general acquaintance with English literature and a correct, clear and forcible use of the language. Rhetoric is studied throughout the freshman year. In the first term a summary review of diction is given. In the second and third terms more attention is given to the development of thought by work upon kinds of composition and the paragraph. In the sophomore year English literature as represented by the work of the essayists and by Shakespeare is

studied. In the senior year one of the required essays of each term will be upon a technical subject prepared under the direction of the professor of civil engineering, the object being to give the engineering student practice in the preparation of clear, concise and systematic reports on engineering subjects. See also pages 50-54.

Modern Languages. All engineering students at the time of entrance must have had two years of either French or German. After entering they are required to pursue French and German each for one year. This will be advanced work for the language offered at entrance, and elementary work in the alternate language not offered. Some work in scientific French and scientific German is done during the latter part of the course. See also pages 46-50.

History and Economics. American history throughout the junior year and economics during the first term of the senior year are required of all engineering students.

Economics, Political Science and International Law. General engineering students who elect "Option B" in engineering administration are required to have economics during the three terms of the senior year, political science during the first two terms, and international law during the last term.

Physiology and Physical Training. See pages 66-67.

Studies of the Six-year Engineering and Latin-Scientific Course. For the studies of this course not described above, see the curriculum on pages 133-139 and the detailed descriptions as follows:—

Latin	Page 44
English Literature	Page 50
Rhetoric	Page 53
History, Sociology	Pages 54, 58
Logic, Psychology	Page 56.
Biology, Geology	Page 64.

Voluntary Studies. Any of the studies of the classical course or of the scientific course of the college may be taken by engineering students without extra charge, on approval of the faculty.

Mathematical and Technical Studies

The following mathematical and technical subjects are included in each of the three engineering courses, and the instruction therein is given in the general engineering department.

Mathematics. To the engineer the subject of mathematics is essential not only for its disciplinary training, but also for its practical applications and use. Both these features receive due consideration in the teaching of the subjects under this head, especial effort being made to incite the student to independent thinking, and to enable him to apply his knowledge of mathematics to his technical work, at the same time holding him to rigorous methods and logical conclusions.

The following courses are required:

Algebra, advanced, including elements of determinants. Required of freshmen. Four hours weekly during first term.

Plane Trigonometry. Required of freshmen in addition to the trigonometry required at entrance. Two hours weekly during first term.

Spherical Trigonometry. Required of juniors in the general engineering course "Option A," and in the sanitary engineering course. Three hours per week during a part of the third term.

Analytic Geometry. Required of freshmen. Four hours weekly during second term, and three hours weekly during third term.

Calculus. Differential and integral calculus. Three hours weekly during third term of freshman year, three hours weekly during first and second terms, and two hours weekly during third term of sophomore year.

Analytical Mechanics. The subjects taught under this head are statics, dynamics, hydro-statics, hydro-dynamics, and pneumatics. These studies form the foundation for the technical studies of applied mechanics, strength of materials and stresses in framed structures, all of which are fundamental to one of the chief divisions of an engineer's duties, namely, that of designing. Required of sophomores. Three hours first term, two hours second and third terms.

Drawing and Descriptive Geometry. The instruction in this work extends through the entire course. In the first term of the freshman year the student is instructed in free-hand drawing and in free-hand lettering. In the second term he is instructed in the use of drawing instruments, in orthographic projections and in construction of geometrical problems and instrumental lettering. In the third term freshman and first term sophomore he is given practice in plotting surveys made in the field. Further instructions in topographical drawing follows in the first term of the sophomore year. Descriptive geometry is begun in the second term sophomore and, in addition to instruction in the theory some of the most common applications in practice are taught by the use of practical problems. Schroeder's models and the Olivier models, as well as the models of intersections of the Paris Polytechnic School, are freely used. In the third term sophomore instruction is given in shades, shadows and perspective and in the theories of oblique projections.

Mensuration and Surveying. This work is begun in the second term of the freshman year by the study of pure and applied mensuration, together with the fundamental principles of error, precision and computations, illustrated by practice. In the third term the theory of surveying instruments and operation is taken up and illustrated by field practice with the chain, tape, compass, transit, level and rod. In the third term sophomore topographical surveying is commenced and instruction and practice are given in the use of the various methods and instruments.

As a preliminary to instruction in each branch of surveying a thorough study of the instruments employed is made, treating their geometrical, optical and mechanical relations; their adjustments and use; and the determination of their instrumental constants, errors and limits of precision. The classes are divided into small sections and directed by the instructors. Office computations, plotting and mapping are made adjuncts of the field survey.

Applied Mechanics and Materials. Applied mechanics is commenced in the first term of the junior year, and comprises the extension of analytical mechanics and the development of the

methods of graphical analysis with their applications to engineering problems, operations and constructions, particularly the treatment of stresses, strains, deflections and deformations in elastic materials and structures due to extraneous forces.

In conjunction with this work is given the study of the production, preparation, strength and physical properties of the various engineering materials, including timber, stones, cement and lime mortar, cast iron, wrought iron and structural steel. Practice in the engineering laboratory is an important adjunct to this study.

This entire division, properly correlated, becomes the foundation of all rational engineering design and construction.

Engineering Law and Procedure. During the first and second terms of the freshman year and the third term of the senior year a series of lectures is given on topics pertaining to the training and the qualifications of engineers, and to the engineering profession. In the junior and senior years in "Option B," and in the third term of the senior year of "Option A," a course is given in the study of the elements of the law and principles of procedure in contracts, agency, corporations, commercial and financial transactions and industrial accounting and of the law relating to land boundaries and titles, water courses and surveys.

Thesis. Each candidate for graduation is required to present on or before the third Wednesday in May of his graduation year a satisfactory thesis on a subject that has been approved by the professors of civil engineering or of electrical engineering. This thesis must be original in its character and may be either a design for some engineering structure or plant, process or operation, or an independent investigation of some principle, problem or matter of engineering importance. Reviews or copies of existing structures, plants or processes, unless of special educational value or involving original investigation, will not be approved as subjects. This thesis is to be in a form prescribed at the time of approval of the subject, and is to be bound for deposit in the library of the engineering school, and must be presented in this shape on or before the stipulated date. The subjects, with outlines of the proposed treatment, must be submitted for approval not later than

November first preceding graduation, and the work on the theses must be presented for inspection and criticism of the professor in charge of the department at intervals during progress.

Library

The college library contains the engineering and scientific library of the late Professor Gillespie and other valuable technical collections. See page 68.

GENERAL ENGINEERING DEPARTMENT

Two Alternate Courses. In the four-year general engineering courses two alternate courses or options are offered, either of which may be selected by general engineering students at the beginning of the junior year, and each of which extends through the junior and senior years. The first of these alternate courses, designated as "Option A," offers a broad, fundamental, general engineering training such as a thoroughly trained engineer should have before specializing in any of the branches of the profession. The other alternate course, designated as "Option B," while in the main identical with the former, differs from it by omitting some of the more technical subjects, such as stereotomy, kinematics, least squares, sewerage, geodesy and field astronomy, and by substituting therefor, sociology, the elements of law, political science and international law, the principles of finance and financial operations, the principles of business management and accounting, and additional work in history and in engineering law and procedure. The object of this alternate course is to offer to engineering students an opportunity better to qualify themselves for engineering positions of an executive or administrative character. These two options are also offered in the six-years general engineering course and extend through the fifth and sixth years.

The details of these two optional courses will be found later on pages 126, 127, 130, 131, 137, 138, 139.

In addition to the studies common to all engineering courses previously described on pages 93-98, the following subjects are

included in the general engineering course. Unless otherwise stated, the following studies are required in each of the two alternate courses in general engineering:

Drawing and Descriptive Geometry (continued). In the junior year work in drawing includes machine drawing and the solution of problems in graphical analysis. In the senior year the subject includes the work in engineering design and construction of the last two terms, and comprises a large amount of structural drawing in the development of the designs of engineering structures. A course in stereotomy and stone cutting is given in the first term senior, with drawings from the stereotomy models of the Paris Polytechnic School. Practice in blue printing is made a part of these courses.

Surveying (continued). Railroad surveying is treated in the third term of the junior year, and the students are given exercises in the proper field operations on railroad surveys, office and field location and staking out work for construction. The subject of railroad construction and equipment is not treated until the first term of the senior year.

Field and Laboratory Practice. In addition to the weekly field and laboratory exercises throughout the year, all freshman, sophomore and general junior engineering students will be given an uninterrupted fifteen days' course in field-practice and laboratory work supplementary to the studies in which such practice is desirable. The course will begin on the day (Thursday) following Commencement and will continue through that and the two following weeks. The work will be so selected and arranged as not only to supplement the studies of the year, but also to give instruction and practice in the organization, operation and direction of work conducted by engineering parties. The practice will form a part of the spring term work.

Astronomy. A short course in descriptive and mathematical astronomy, occupying, with some preliminary work in spherical trigonometry is given. Three hours during the spring term of the junior year.

Least Squares, Geodesy and Field Astronomy. This course is given three hours weekly, during the second and third terms of the senior year. After a study of the fundamental principles of the adjustment of errors and their use in finding the weights and probable errors and in establishing empirical formulas, a discussion of the figure of the earth, triangulation, base lines, and precise leveling is taken up, accompanied by field work which also includes the determination of time, latitude, and azimuth, with ordinary instruments and with methods and instruments of an observatory.

Engineering Design. The course in applied mechanics and materials prepares the student to undertake the study of engineering design proper, which is pursued throughout the senior year; an important feature of this course is the work in bridges, railroads and water-power developments, architectural engineering, etc. The exercises in this line of work are, as far as possible, chosen from professional practice, and the student is expected to carry out, from assigned data and conditions, the preliminary study, determinations of stresses, types, dimensions and details, and to turn in the results in the form of working drawings, diagrams and memoirs. The course is preceded by a series of lectures on the principles and economics of designing. The department possesses a large collection of drawings and photographs of representative engineering structures from which students can form correct ideas of modern practice in the designing of details and in the methods followed on works of this class.

Water. The subject of water is considered from several standpoints. In the first term junior is given a laboratory course in chemistry, followed by a course in water analysis. In the third term junior is given a course in hydraulics, followed in the senior year by a fuller development of the subjects as applied to rainfall, run-off and storage of water, in relation both to water power and to potable water supplies. This course is accompanied by a study of the sanitary aspects of the subject of water supply and its preservation from contamination. An outline study is also made of pumping engines. The new laboratory affords oppor-

tunity for experimental work on flow of waters through orifices and pipes, and for tests of pumps, etc.

Highways. The study of highways in the first term of the junior year comprises a consideration of the highways as an element in the transportation system of the state, the principles of its economic location and proper construction, a study of the various modes of construction and the materials employed, its proper maintenance and systems of highway laws and administration.

As a preliminary to the study of highway location as well as of railroad route surveying, some consideration is given to the principles and fundamental laws of topographical types and forms and their relation to the various modes of earth sculpture.

Streets and Pavements. A study of the methods of laying out and grading streets and pavements and of the various street accessories, paving methods and materials and their treatment, with special reference to their economic and sanitary aspects, is also given during the first term of the junior year.

Motors and Motive Power. Following the work in thermodynamics and hydraulics of the third term of the junior year an outline course in motors and motive power is given in the first and second terms of the senior year, comprising a study of the sources of demand and supply of power, steam-boilers, steam-engines, steam turbines, water-wheels and turbines, gas-engines, electric motors and transmission of power by shafting, belting, rope-driving, compressed air and electricity. The new laboratory affords opportunity for efficiency tests of hydraulic and other forms of motors.

Electrical Machinery and Transmission. Following the instruction in electricity in the department of physics, general engineering students are given, during the second term of the junior year, a three-hour course in the fundamental principles and practice of electrical generators, motors, transformers, transmission and instruments.

Principles of Finance, Business, Accounting. General engineer-

ing students who elect "Option B" are given instruction in the principles of finance and financial operations, the principles of business and of industrial organization, and the principles of accounting and of cost-keeping during the second and third terms of the senior year.

Equipment

General Engineering Building

The new engineering building, the donation of Mr. Andrew Carnegie for the general engineering department, has recently been completed at a cost of \$100,000. It is a handsome structure of modern design, built of gray and buff pressed brick with gray stone trimmings.

The building is of fireproof construction throughout, the only wood used being in the doors, windows, and floor surface. It covers an area of 67 x 137 ft. and is three stories in height, with a basement above the ground level, making it practically four stories.

The entire east end of the basement, 50 x 62 ft. in area, will be used as a hydraulic laboratory. It is equipped with a steel tank 5 ft. in diameter and 52 ft. high, extending to the roof, with a tight cover so that it can be used as either a gravity or a pressure tank. The base of the tank will be provided with connections for standard orifices of various sizes and shapes. Connections will also be provided so that turbines and other forms of water motors can be driven by water from the tank under different heads. This room also contains a concrete canal 5 ft. deep, 9 ft. wide and about 20 ft. long, which will be extended out of doors to a total length of 100 ft. It will be arranged for the insertion of temporary dams at different points along its length, so that weirs may be used for the measurement of large flows of water. It is also to be used as a large measuring tank in connection with pump tests, and for various other hydraulic experimental purposes.

In the southwest corner of the basement is the cement laboratory, 46 x 26 ft. in area, equipped for the testing of cement, concrete, and similar structural materials.

The basement also contains a locker room, with 50 individual lockers for the use of students when working in the laboratories, and there is also a large and well-ventilated toilet room.

The northwest corner of the basement is taken up by a room for surveying instruments, with lockers, etc., for issuing equipment to field parties. Ready access is obtained to this room by an outside entrance at the west end of the basement corridor. This instrument room is connected by a lift with a large instrument laboratory on the first floor, which will also be furnished and used as a computing room by surveying classes.

On the first floor, besides the large computing room just mentioned, there is a large office and a room for the use of the engineering faculty.

In the southeast corner is an engineering museum, where models of bridges and other engineering structures will be placed, so as to be accessible for inspection.

The museum is connected by sliding doors with the engineering library and reading room. Here will be placed the valuable Croes library recently donated to the department by E. B. Van Winkle of the class of 1860, and also the large collection of engineering drawings, etc., belonging to the department.

The first floor also contains two recitation rooms, and one drawing room for the use of the class in engineering design.

On the second floor the north half is taken up by two large lecture or society rooms, each of which can be divided by folding partitions into two recitation rooms of the usual size. The south half of this floor is taken up by the applied mechanics laboratory, 40 x 25 ft., and one large and one small recitation room. In the southeast corner is the sanitary engineering laboratory.

On the third floor are two large drawing rooms, each about 24 x 60 ft., and three smaller drawing rooms. All of these rooms are well lighted by windows and skylights. On this floor is also a good-sized blue-print room, a photographic room, and a dark room.

Each floor contains two or more small private offices for the use of instructors; and the entire plan of the building is admirably adapted to the needs of the department.

Instruments and Apparatus

The department is supplied with field instruments of the best description, comprising a large theodolite, suitable for refined geodetic operations, transits, surveyors' compasses, prismatic compasses, Burnier's compass, solar compass, Y levels, plane tables, sextants, mountain barometers, aneroid barometer and a marine chronometer.

The extensive private collection of models and instruments belonging to the late Professor Gillespie was purchased for the engineering school.

The collection of models in descriptive geometry and stereotomy is very complete. The following are some of the most important:

The Olivier Collection. This consists of about fifty models, representing the most important and complicated ruled surfaces of descriptive geometry, particularly warped or twisted surfaces. Their directrices are represented by brass bars, straight or curved, to which are attached silk threads representing the elements or successive positions of the generatrices of the surfaces. Each of these threads has a weight suspended by it, so as always to make it a straight line. These weights are contained in boxes sustaining the directrices and their standards. The bars are movable in various directions, carrying with them the threads, still stretched straight by the weights in every position they may take; so that the forms and natures of the surface which they constitute are continually changing, while they always remain ruled surfaces. In this way a plane is transformed into a paraboloid, a cylinder into a hyperboloid, etc.

These models were invented by the late Theodore Olivier while professor of descriptive geometry at the Conservatoire des Arts et Métiers, in Paris. One set of them is now deposited there, and a second is in the Conservatory at Madrid. Copies of some of them are to be found in most of the polytechnic schools of Germany. The Union College set is the original collection of the inventor, having been made in part by his own hands, and, after his death, in 1853, retained by his widow till bought of her by Professor Gillespie, in 1855. It is more complete than that in

the Paris Conservatoire. It may be worth noticing that the silver plates on the boxes, reading "*Inventé par Théodore Olivier*," etc., were added by Madame Olivier, at her own expense, after the purchase, as a tribute to the memory of her husband, her own words being, "*Je tenais à ce que chaque instrument portât le nom du savant dont la réputation passera à la postérité.*"

Professor Bardin's (Paris) plaster models (seventy) of the intersections of prisms, pyramids, cylinders, cones, etc.

Schroeder's (Darmstadt) models (twenty) of elementary descriptive geometry. The planes of projection are in wood, and the lines and surfaces in metal; models illustrating shades and shadows.

Stone Cutting Models (twenty) in plaster, selected from those of L'Ecole Polytechnique of Paris.

Professor Bardin's models (ten) in plaster, of oblique arches.

Groined and cloistered arch models (ten) in wood and plaster.

Models of structures in stone, consisting of bridges, culverts, etc.

Winding-stair models in wood and plaster. Full sized models of voussoirs and skew-backs of an oblique arch.

Models in Topography. French and German plaster models, giving all the different forms of ground, accompanied by topographical drawings, showing how to represent these forms by contour lines; hatchings and shades from vertical and oblique light; models and maps in colored topography; a large model of Mount Cenis pass, showing the wagon road and contour lines.

Architectural Models. Models of the five orders of architecture from L'Ecole des Beaux Arts, Paris; portals; stairs; roofs; walls; buttresses; domes, etc.

Engineering Models. Schroeder's models of joints, brick bonds, etc.; spur wheels; bevel wheels; cranes; pile drivers; various forms of water-wheels; pumps; cylinders; valves; eccentrics; etc.; steam engines.

Casts of St. Venant's models showing the changes of form in bodies subjected to flexure. Full sized model of the liquid vein measured by Poncelet and Lesbro.

Models of bridges of various systems, comprising truss, suspension, tubular and arch bridges; Doyme's dynamometer bridge models showing, by means of dynamometer, strains at different points; models of roof trusses, arranged for using the dynamometer to show the different stresses.

Models of fortifications, illustrating Vauban's system; shot, shell, etc.

Models of culverts, piers, abutments, culvert heads, wing walls, rail sections, etc.

Maps, Drawings, Etc. This collection embraces a large number of maps, plates, profiles, topographical drawings and spherical projections; about fifty thousand engravings, lithographs, photographs and detail drawings of engineering and architectural structures; working drawings of machines, bridges, buildings, etc.

Physical Apparatus. To illustrate the lectures in physics, the college has an extensive collection of apparatus. This has been secured largely from foreign makers and includes special pieces of apparatus constructed under the direction of the late Professor Foster, besides sets of apparatus of standard patterns by Koenig, Duboscq, Ruhmkorff, and others.

In Mineralogy. The Wheatley collection contains nearly 4,000 specimens of minerals, the result of the labors of Charles M. Wheatley. All of these have been labeled according to the nomenclature and order adopted by Dana. They are, without exception, open at all times to the students. They furnish an admirable means of practical illustration in mineralogy. Among the rare and valuable specimens are those of anglesite, cerusite, mimetite and calcuprite, which in American specimens are equaled only by those in the British Museum. There are many fine specimens representing the noble metals from all parts of the world. There are few known species of minerals of which the collection does not contain some specimens.

In addition to this there is a large series of unlabeled specimens for crystallographic and blow-pipe examination.

In Metallurgy. The college possesses a suite of ores of the useful metals, comprising over 1,000 specimens. These have been

arranged to illustrate their mode of occurrence and geographical distribution. In addition are the fluxes, fuels, etc., used in obtaining the metals from the ores, together with the slags and metals themselves in various forms. There is a large number of models and drawings of stacks, furnaces, etc.; also suites of specimens of wood, charcoal, mineral coal, peat, etc., for physical inspection; also specimens of most of the useful alloys.

In Chemistry. The chemical laboratory is furnished with tile-top desks and lockers, and all the modern apparatus necessary for work in general chemistry and qualitative and quantitative analysis. Ample hoods occupy one side of the laboratory, where the student may work with the disagreeable and poisonous gases. In the private laboratory of the professor of chemistry provision is made for any students who may desire to pursue advanced courses, either in volumetric analysis, water and milk analysis, organic chemistry, or any special work in connection with courses of other departments.

A large number of specimens of the materials used in the manufacture of the mineral and some of the organic acids; the crude products themselves and the materials used in the manufacture of the alkalis, soaps, matches, black lead, candles, petroleum products; linseed, olive, castor, cottonseed and other oils; paper, porcelain, glass, fire and building brick, mortar and cements, beet and cane sugar, white lead and other paints, etc., etc., form a part of the permanent collection of the department.

SANITARY ENGINEERING DEPARTMENT

General Considerations. The extensive development of sanitary biology during recent years and the establishment on a firm, scientific basis of the germ-theory of disease have laid a secure foundation for the important specialty of sanitary engineering. Already the practical application of the principles in many lines of public utility, as well as in medicine and surgery, has resulted in a very marked decrease in the annual death rate. The most fruitful line of application of this recent and useful knowledge lies in the intelligent design, construction and operation of mu-

municipal public works and of systems of water supply, sewerage and drainage, heating and ventilation of private residences, schools, hotels, hospitals and other public institutions and buildings.

General Scheme of the Course. The course in sanitary engineering differs from the general engineering course by omitting astronomical surveying, geodesy and railroad construction, and substituting therefor sanitary biology, heating and ventilation, house drainage and plumbing, sanitary codes and laws, and an increase in the amount of chemistry and chemical laboratory work.

Sanitary Conditions of Buildings. In the first and third term senior, respectively, are given courses in heating and ventilation and in house drainage and plumbing. The latter course will give special attention to the matter of water supply and of the removal of wastes from buildings in all situations, from the isolated country house to that in a thoroughly drained city.

Sewerage and Drainage. The study of the principles and practice of sewerage and sewage disposals is given during the last term of the senior year. The fundamental sanitary and constructive principles will be developed and a comparative study of the various systems as well as of the details of construction and maintenance receives careful attention. A course of lectures in the third term senior presents the principles upon which the laws touching the subject of the public health are based and the outlying principles which should govern the preparation of sanitary codes and regulations.

Graduate Course

Leading to the Degree of M. C. E.

This course of one year's graduate study, consisting of lectures, laboratory and research work is open to graduates of the general or the sanitary engineering course of Union College or of any other institution of a standing recognized by the faculty.

Correspondence regarding admission to the undergraduate courses should be addressed to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* Correspondence regarding admission to the graduate course in civil engineering may be addressed to

DR. OLIN H. LANDRETH

Professor of Civil Engineering
Schenectady, New York

ELECTRICAL ENGINEERING DEPARTMENT

Purpose and Methods. A course of instruction in electrical engineering was introduced in 1895, and in 1902 was re-organized and made into a separate department of the engineering school under the direction of Professor Charles P. Steinmetz, consulting engineer of the General Electric Company.

The course of studies offered by the department of electrical engineering aims at a thorough and broad scientific education of the prospective engineer, rather than the specific training of a specialist. The instruction, therefore, consists of three classes of studies. The general culture studies furnish such training as is now considered essential for every educated man, as languages, literature, history, etc. Such instruction extends over a large part of the first two years, and is then followed by a broad and general technical education, giving the student the fundamental principles and their application to all branches of engineering. Ultimately follows the specific instruction in electrical engineering, which, while it enables the student, after graduation, to enter the field of electrical engineering practice in the manufacturing or operating company or consulting engineer's office in a subordinate capacity only, has given him all the necessary requirements to gather in a few years' practice the knowledge needed for independent work of greater magnitude.

The instruction especially aims at a thorough understanding of the fundamental principles rather than a memorizing of numerous facts—that is, aims at quality, and not quantity—and as far as possible in all engineering instruction the subject is brought before the student in three different ways; by a theoretical lecture

course with recitations, practical instruction in the electrical laboratory paralleling the lecture course, and, following this, the application of the knowledge gained in lecture courses and laboratory to calculation and design in the drafting room. Finally, more independent work on the solution of engineering problems is undertaken by the students. These problems invariably require some research work; the systematic tabulation of the results with original conclusions constitutes the graduating theses. Throughout the technical course, by work in the laboratory, some familiarity with the apparatus is given to the students before the technical side is taken up in the lecture course, so that when approaching the theoretical studies of electrical phenomena or apparatus the student is already able to appreciate the practical value and importance of the subject with which the theoretical investigations deal.

Through the active interest which the General Electric Company takes in technical education, an arrangement has been effected between the college authorities and the officials of the company by which the students in the junior and senior classes are admitted to the company's works at appointed times, under the direction of their instructor, with the privilege and opportunity of studying and inspecting the plant and operations and of being regularly instructed therein. The work has been systematically arranged, and is given simultaneously with the corresponding class and laboratory work, to which it forms an important and valuable adjunct.

List of Studies

In the following list of studies, only those subjects of the electrical engineering course which are not required in the other courses are described in detail. All the culture studies and most of the general engineering and scientific studies are pursued in common with the students of other engineering branches. Beginning with the junior year, however, the courses diverge. The electrical engineers take up a number of mechanical engineering subjects and continue them throughout the junior and first part of the senior year. In fact, during the junior year the

mechanical engineering work may be considered as constituting the major subject, though a considerable amount of time is also devoted to electrical engineering.

Studies also required in other courses are:

American History	Page 55
Rhetoric	Page 53
Descriptive Chemistry	Page 63
Physical Chemistry	
Logic	Page 56
Economics	Page 58
Engineering Law and Procedure	Page 98
Engineering Mathematics	

The mechanical engineering subjects not previously described are:

M.E.1. Hydraulics. A study of the principles of hydraulics, hydraulic machinery and the elements of turbine design. First and second terms, MR. CUNNINGHAM.

M.E.2. Heat Engines. Thermodynamics, the theory of the steam engine, the steam turbine, internal combustion engines and design. Second and third terms, MR. KING.

Other general subjects given only to electrical engineering students are:

C.E.1. Elements of Civil Engineering. The work and methods of the civil engineer. This course is given to broaden the ideas of the student, thus enabling the electrical engineer to value properly the labors of his colleagues in this allied department of the profession. Third term.

Seminar. Throughout the junior year one hour per week is given in mathematical seminar. Practical engineering problems are proposed, in the solution of which it is necessary to utilize the field of mathematics previously covered. Mechanics, thermodynamics, hydraulics, electrical phenomena of permanent or transient form—all combining to make an inexhaustible field from which graded problems are selected. This is a practical

application of algebra, trigonometry, calculus, etc. Associate Prof. FERGUSON.

The electrical engineering studies include the following:

E.E.1. Engineering Mathematics. One lecture per week is given in the third term of the junior year in preparation for the more advanced work given by Dr. Steinmetz in his course for the senior year. Third term, Dr. STEINMETZ.

E.E.2. Direct Current Circuits and Apparatus. Students in electrical engineering devote a considerable part of the junior year to the study of the fundamental principles of the subject. Direct current phenomena are studied first, as this part of the subject is somewhat simpler and is readily brought within the grasp of the average student. This work includes the theory and practice of direct current generators and motors and auxiliary apparatus, taking into account also the principles of design. First and second terms, Mr. KING.

Alternating Current Circuits and Apparatus

E.E.3. Junior. Fundamentals of alternating current circuits and machines. Many problems are assigned in order to make the work specific and concrete. Second and third terms, Mr. CUNNINGHAM.

E.E.4. Senior. A continuation of E.E.3, becoming more advanced. Analyses and discussions of generators, synchronous motors, transformers, induction motors, series motors, convertors, higher harmonies, etc. First and second terms, Associate Prof. FERGUSON.

Electrical Laboratory

E.E.5. Direct Current Laboratory. The work under this head is parallel with E.E.2, and includes all standard tests of direct current machines, and is supplemented by numerous experiments arranged with due regard to their general importance and scientific value. The machines with which the student has become more or less familiar in class work are here examined in detail and careful records made of efficiency, regulation, internal charac-

teristics, commutation under varying loads, etc. First and second terms, Mr. CUNNINGHAM.

E.E.6. Alternating Current, Junior. The work done here in the junior year consists of an extensive series of experiments corroborating and explaining the theories of the lecture room. The exercises consist in investigation of voltage and current conditions on a variety of combinations of resistance, inductance and capacity in series and in multiple, the exploring of field flux and wave shapes of alternators, and the effect of inductance and capacity on wave shape, the use and calibration of meters, the potentiometer, the photometer, etc. Upon entering the senior year the student is thus equipped with the broad foundation in the underlying principles of electrical engineering, which is absolutely essential to a comprehensive study of the more intricate and special departments of the subject. Third term, Mr. CUNNINGHAM.

E.E.7. Alternating Current, Senior. In this course complete tests are made on the apparatus studied, and the characteristics of the various machines are determined. The laboratory work deals with the transformer: ratio, impedance and core loss characteristic, regulation and heat runs, the synchronous motor and generator: amplitude and phase displacement of the various phases of multiphase machines, no load and load saturation, phase characteristics, pulsation, regulation and compounding curves, starting test, etc., the induction motor: determination and plotting of curves for power factor, speed, slip, torque, efficiency as function of speed, starting tests on motors with squirrel cage armatures and compensator, also on machines with variable rotor resistance, impedance and core loss curves and maximum output determination, the single phase induction motor, the use of the oscillograph, etc. First and second terms, Mr. CUNNINGHAM.

Electrical Apparatus Design

E.E.8. Direct Current Machines. When E.E.2 has been finished each student is directed to design a specified machine and is required to do this work in class and without other aid than that given by the instructor. Complete calculations, with curves,

where necessary, and working drawings of the machine designed, are required, and credit is given for accuracy, originality and neatness. Third term, Mr. KING.

E.E.9. Alternating Current Machines. This subject is a continuation throughout the senior year of the machine design begun during the junior year, and the two are handled in much the same manner. Transformers, induction motors, alternating current generators, etc., are calculated and their layouts completed. As each type of machine is taken up, fundamental lectures are first given, outlining the requirements for successful construction and operation and supplying data for all computations. Individual work is then assigned to each student and is carried out under the personal supervision of the instructor. First, second and third terms, Associate Prof. FERGUSON.

E.E.11. Electric Lighting. Wiring, systems of distribution and their comparative economy and efficiency, standard types of incandescent lamps and arc lamps, recent developments in these lines, vacuum tube lamps, the arc, photometry, illuminating engineering, etc. Third term, Associate Prof. FERGUSON.

E.E.12. Technical Literature. In this course, students are required to report in class upon current publications assigned to them, reviewing briefly the best articles found. There are also included library references to biographical sketches and research works of eminent men.

It is intended by this means that the student shall become broadly familiar with the sources of the best and the most recent technical literature; that he shall learn how to keep abreast of the times; that he shall acquaint himself with channels through which he may obtain information upon any particular subjects; that he shall be able to summarize any article he reads, picking out its salient points; that he shall receive practice in expressing his thoughts clearly and concisely upon important subjects. Third term, Associate Prof. FERGUSON.

E.E.14. Electric Transmission. The subjects discussed here are long distance transmission, line construction, systems, grouping of machines, control of phase, methods of compensation, maximum power supplied over line, line efficiency, copper efficiency, distributed capacity, inductance, resistance, leakage and natural period of transmission line, surging, resonance due to higher harmonics, balanced and unbalanced polyphase systems, transformations, lightning, lightning protection. The subject is subdivided in such a way that it may be considered that the first term covers the power plant and generation, the second term covers transmission and distribution, and the third term is devoted, mainly, to design and calculations for a power system. First, second and third terms, Mr. KING.

E.E.15. Electric Railways. The subject of electric railway engineering is treated in three sections: 1. From the point of view of the consulting engineer who, being retained by the promoters of a proposed railway, investigates the field and territory of the new line, advises as to probable earnings of line, lays route, prepares plans and specifications and has charge of construction. 2. From the point of view of the operating engineers who have charge of rolling stock and maintenance of service on the line. This includes a complete discussion of the equipment of modern electric railways, the various systems in vogue, sub-station equipment and in general the operation of electric railways. 3. The problem of the electric railway as it is presented to the designing electrical engineer is discussed. About half of the time devoted to railways is reserved for this section of the work. The questions of predetermination of railway motors from service characteristics, of train resistance and other quantities affecting the operation of electric trains are treated and the various alternating current railway motors which are being developed are discussed. Second term, Associate Prof. FERGUSON.

E.E.17. Electrical Engineering Practice. This course of lectures is designed to put the student into touch with the most recent developments of advanced engineering practice. It emphasizes the fact that an engineer must be well equipped and

resourceful in order successfully to attack new problems. It is an outgrowth of what was formerly known as a lecture course by specialists. Second and third terms.

Among those who have consented to give lectures in this course for the current year are:

E. B. MERRIAM

H. M. HOBART

J. B. TAYLOR

C. M. DAVIS

E. E. F. CREIGHTON

F. W. PEEK, JR.

E.E.18. Electrical Engineering Theory. Beneath the whole superstructure of electrical engineering is one broad base. This foundation is the same for alternating currents, or direct currents; motors or generators; power circuits or telephone circuits; local distribution or long-distance transmission; permanent phenomena or transient phenomena. These courses of lectures lead to a better conception of relations existing among the seemingly widely separated branches of the applied science and furnish foundation and incentive for subsequent advanced work. First, second and third terms, Prof. STEINMETZ and Associate Prof. FERGUSON.

E.E.19. Thesis. (See page 98) The thesis subject chosen early in the year becomes a topic for report each term. Progress during the first and second terms is outlined and described in Technical Essays. During the third term considerable time is given to the development and completion of the investigation and a final report is made upon it. Independent work and originality are encouraged, and, although the work is supervised, this oversight is accomplished with as little intrusion as may be consistent with satisfactory results.

Lectures by Engineers. To juniors and seniors of this course is available the notable privilege of becoming, upon the payment of a nominal fee, members of the Schenectady section of the American Institute of Electrical Engineers. Throughout the winter occur, before this section, a succession of lectures probably without an equal except before the national body itself. The value of this course cannot be overestimated. During the past

season there was held under the auspices of the Schenectady and Pittsfield sections the midwinter convention of the institute at which were given about eighteen papers upon important electrical subjects. The General Electric Company's plants at each of these places were thrown open for inspection trips and special exhibitions were arranged.

A representative list of the speakers is added:

GANO DUNN	RALPH W. POPE
E. J. BERG	W. L. R. EMMETT
Prof. A. G. WEBSTER	DR. W. R. WHITNEY
E. B. MERRIAM	D. B. RUSHMORE
W. B. POTTER	C. I. BURKHOLDER
Prof. W. S. FRANKLIN	C. F. SCOTT
W. S. ANDREWS	Dr. ELIHU THOMSON
Prof. C. P. STEINMETZ	E. W. RICE, JR.
GIUSEPPE FACCIOLI	Prof. E. E. F. CREIGHTON
W. S. MOODY	A. B. HENDRICKS

Electrical Laboratory Equipment

The electrical engineering laboratory is a commodious, well-lighted building, and permits the arrangement and grouping of the machines in a flexible relation to each other.

The ground plan of the building is T-shaped. The upper bar of the T has two stories. The lower floor is devoted to three laboratory rooms, the largest of which is 101 ft. by 35 ft. outside dimensions. This is the main laboratory and extends from front to rear of the building.

A light well-ventilated drafting room occupies the major portion of the second floor, being 73 ft. by 27 ft. in dimensions.

The purpose of a college laboratory of electrical engineering is two-fold: To familiarize the student with the shape, appearance, relative proportions and construction of modern electrical apparatus, and to instruct him in the handling, assembling, testing and operation of electrical apparatus under normal and abnormal conditions.

Because of the great variety and large size of modern electrical apparatus, the former purpose can be fulfilled very incompletely

only, even in the largest and best equipped college laboratories. Through the favorable disposition of the General Electric Company, by giving the electrical engineering students of Union College free access to the works and testing rooms, this purpose is admirably fulfilled here, and by frequent and regular inspection trips to the works and testing department of the General Electric Company under the direction of the college instructors, which trips constitute an integral part of the laboratory instruction, the students gain a very intimate knowledge of modern electrical apparatus of all types and sizes, not only when assembled and in operation and test, but also during their construction in the shops.

In equipping the college laboratory special consideration was therefore given to the selection only of such representative types of apparatus as can be handled, operated and tested by the students, and machines are of a size sufficiently large to correspond to modern practice, but not so large as to make the operation under abnormal conditions—that is, under conditions which as a rule are specially instructive—unsafe for the apparatus. All such machinery as the student can not be permitted to handle freely was excluded from the equipment.

Power is supplied from the following sources: A direct connected unit consisting of a Westinghouse gas engine and a direct current generator; a motor-generator set consisting of a 55-h.p. direct current motor direct connected to a 30 kw., 120-240 volt, three-phase, 60 cycle alternator; a motor-generator set consisting of a 17.5 kw. direct current generator direct connected to a three-phase 220-volt induction motor; connection with the 550-volt direct current trolley circuit of the Schenectady Railway Company; connection with a three-phase 2300-volt power circuit of the Schenectady Illuminating Company. In the latter case voltage is reduced by banks of step-down transformers, so that the students can handle the safe low-tension circuits only.

A secondary supply is also secured by means of a group of lead plate storage batteries charged by a mercury arc rectifier upon the alternating current power circuit.

A very large number of various sizes of transformers is provided to give the students practical experience in connecting transformers for different ratios and for transformation between

three-phase, quarter-phase, six-phase, etc., systems. The equipment further contains three-phase, quarter-phase and six-phase alternators and synchronous motors, the two characteristic types of induction motors, three and six-phase rotary converters, bipolar and multipolar generators, commutating-pole motors, and numerous smaller induction motors, converters and direct current motors and generators of different types. A constant current arc machine, with different types of arc lamps and a constant alternating current transformer, with series arc lamps, testing tables, switchboards, oilswitches, and numerous instruments of the indicating and the integrating type, are also provided for efficient instruction.

Among the recent additions to the laboratory are an oscillograph and a potentiometer. The former is the standard three galvanometer type, manufactured by the General Electric Company, with photographic and tracing attachments. With this instrument wave forms may be traced or photographically recorded and transient phenomena of the electric circuit studied and investigated. The potentiometer is an absolute standard for the calibration of electrical instruments and is similar to that used by the Public Service Commission of New York State.

Inspection Trips

It is desirable that each student in the electrical engineering courses participate at least once during his college life in an extended trip of inspection of engineering activities. Such trips are, therefore, arranged at a low cost to each man and vary from year to year. For the past two years the excursions have been to New York City and have covered two or three days with an average expenditure of about \$12.00 per capita. It is the policy of the department to continue to arrange such trips and to conduct them when sufficiently representative groups of men can attend.

Graduate Course

Leading to the Degree of M. E. E.

To students desiring to continue their studies a short time beyond the four-year course, a graduate course of one year is

offered in which, besides instruction in higher branches of electrical engineering, there will be occasion to carry out original investigations under the supervision and with the assistance of specialists prominent in electrical engineering practice on subjects closely connected with the most recent advance of electrical engineering. In return for the assistance offered to the graduate students in their research work such students may be required to devote a small part of their time to assisting the regular college instructors in laboratory instruction. This course leads to the degree of Master of Electrical Engineering, and is open to graduates of Union College or of other institutions approved by the faculty. The work is to be done in residence and all options described below fall within this requirement.

The options open to Union College graduates are:

1. Three terms' work in residence.

For this course registration is required at the college office for the three terms.

2. One-half year of engineering work with General Electric Company, supervised by the electrical engineering department of the college, and two terms of college work in residence.

For this course registration is required with the electrical engineering department before entering upon any accredited work, and at the college office for the two terms preceding the granting of the degree.

3. At least one and one-half years of engineering work with the General Electric Company, supervised by the electrical engineering department of the college, and a thesis representing a distinct advance in the science.

For this course registration is required with the electrical engineering department eighteen months before granting of the degree and at the college office for one term preceding the granting of the degree.

Graduates of other colleges must register at the college office for the full year preceding the granting of the degree. The course may be arranged, at the discretion of the department, to include a certain amount of work with the General Electric Company.

Some of the courses offered to the graduate students are as follows, although not all of these subjects are given each year:

Psychology	Sociology
Philosophy	Advanced calculus
Geology	Differential equations
Economics	Long distance transmission

Design and control of electric power systems of very great magnitude

Electric railway and traction, continued

Modern theory of electrical engineering, continued

Oscillating currents and high frequency phenomena

Transient phenomena, lightning and lightning protection

Wave transmission, with special application to telephony

Scientific foundations of electrical engineering

Electro-chemistry

Light and illumination

Electrical engineering apparatus

Steam turbines

Storage batteries

Telephone engineering

Laboratory

Research work

Some of the lectures given by Professor Charles P. Steinmetz to graduate students are as follows:

Review: The electric, magnetic and dielectric circuit. Resistance, inductance, capacity and wireless telegraphy.

The law of electromagnetic induction; electric apparatus and machines:

The characteristic curves of electrical apparatus, machines and circuits. Magnetic characteristic: saturation and excitation curve. Load characteristic: regulation curve, field characteristic compounding curve. Phase characteristic of alternating current apparatus; Efficiency, no load and load losses.

Commutating machines: direct current generators and motors.

Synchronous machines: alternators and synchronous motors and converters.

Induction machines: induction motors and generators, single phase and polyphase repulsion motors and generators.

Rectifying machines: the arc machine, constant potential and constant current rectification, arc rectifiers and electrolytic rectifiers.

Transformers and reactors: constant potential and constant current.

Meters: indicating, integrating and recording.

Transient phenomena: starting and building up of direct current generators: effect of field inductance and fluctuating load: starting of synchronous machines.

Starting of transformers, of inductive circuits, of circuits containing inductance and capacity, transmission lines, short circuit phenomena of circuits containing inductance and capacity. Transmission lines, short circuit oscillations.

Short circuit current of direct and alternating current generators.

Hunting or surging of synchronous machines, motors and converters. Hunting or surging of induction machines, of direct current motors and generators.

Alternating current series motors.

In addition to this a course is given on the design of electrical apparatus, in which the students carry out the design of a number of typical machines and apparatus under the personal direction of Professor Steinmetz. The course includes the discussion of all the elements entering into the practical design and construction.

Graduate Course

Leading to the Degree of Ph. D.

There has been recently established a course of study leading to the degree of Doctor of Philosophy. This degree is meant to signify breadth of training and high attainment, rather than the completion of a certain amount of work or the study of subjects chosen for a definite period of time. It will be conferred upon the candidate upon the satisfactory fulfillment of the following conditions:

- I. The applicant for admission to this course must present a Master's degree received in recognition of work of a nature indicating preparation for advanced electrical study.

2. The candidate must spend at least two years in resident work under direction of the faculty.

3. The major subject of study must be electrical science.

4. Two minor subjects of study must be pursued, one of which is to be philosophy.

5. At the completion of the course, and two months before the conferring of the degree, a suitable thesis must be presented to the head of the electrical engineering department, representing original work and indicating strength and ability in independent investigation.

6. Fifty printed and bound copies of this thesis must be deposited in the college library before the successful candidate may receive the diploma for his degree. The degree may be conferred, however, before such copies are deposited, upon the presentation to the treasurer of proper security for their provision. In this case, a bound typewritten copy shall be placed in the library previous to the conferring of the degree.

Correspondence regarding admission to the undergraduate courses should be addressed to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* Correspondence regarding admission to the graduate courses in electrical engineering may be addressed to

DR. CHARLES P. STEINMETZ
Professor of Electrical Engineering
Schenectady, N. Y.

CURRICULA OF ENGINEERING COURSES

The numeral after a subject refers to the course as described in the departmental statement; the number in parenthesis refers to the page where the statement is given.

Courses Leading to Degree of B.E.

Freshman Year, all courses

First Term

French 1 or 2....(49).....	3 hours
German 2 or 1....(46).....	3 hours
Rhetoric 1....(50).....	2 hours
Freehand Drawing....(97).....	3 hours
Algebra....(96).....	4 hours
Physiology....(66).....	1 hour
Trigonometry....(96).....	2 hours
Lectures....(98)	

 Total 18 hours
Second Term

French 1 or 2....(49).....	3 hours
German 2 or 1....(46).....	3 hours
Rhetoric 1....(50).....	2 hours
Analytic Geometry....(96).....	4 hours
Mensuration....(97).....	2 hours
Mechanical Drawing....(97).....	3 hours
Gymnastics....(66).....	1 hour
Lectures....(98)	

 Total 18 hours
Third Term

French 1 or 2....(49).....	3 hours
German 2 or 1....(46).....	3 hours
Rhetoric 1....(50).....	2 hours
Calculus....(96).....	3 hours
Analytic Geometry....(96).....	3 hours
Surveying and Plotting....(97).....	2 hours
Physiology....(66).....	1 hour
Field and Laboratory Work following Commencement	

 Total 17 hours

Sophomore Year, all courses

First Term

Rhetoric 8....(53).....	1 hour
Calculus....(96).....	3 hours
Mechanics....(96).....	3 hours
Physics 2....(61).....	3 hours
Chemistry 1....(62).....	3 hours
English Literature 3....(51).....	2 hours
Hygiene....(66).....	1 hour
Topographical Surveying....(97).....	2 hours
Summer Vacation Work	

 Total 18 hours
Second Term

Rhetoric 8....(53).....	1 hour
Calculus....(96).....	3 hours
Mechanics....(96).....	2 hours
Physics 2....(61).....	4 hours
Chemistry 1....(62).....	4 hours
English Literature 3....(51).....	2 hours
Descriptive Geometry....(97).....	3 hours

 Total 19 hours
Third Term

Rhetoric 8....(53).....	1 hour
Calculus....(96).....	2 hours
Mechanics....(96).....	2 hours
Physics 2....(61).....	4 hours
Chemistry 1....(62).....	4 hours
English Literature 3....(51).....	2 hours
Descriptive Geometry; shades and shadows.....(97)....	3 hours
Field and Laboratory Work following Commencement	

 Total 18 hours

Junior Year, General Engineering, Option A

First Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
Applied Mechanics....(97).....	4 hours

Chemical Laboratory 2....(63).....	4 hours
Highways and Pavements....(102).....	4 hours
Topographical Surveying and Mapping....(97).....	3 hours
Summer Vacation Work	

Total 18 hours

Second Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
Mechanics of Materials and Engineering Laboratory...(97)	5 hours
Kinematics and Machine Drawing....(100).....	3 hours
Electricity....(102).....	3 hours
Thermodynamics....(102).....	2 hours
Natural Perspective....(100).....	1 hour

Total 17 hours

Third Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	1 hour
Stresses and Graphical Analysis....(97).....	4 hours
Hydraulics....(102).....	3 hours
Route Surveying....(100).....	3 hours
Spherical Trigonometry and Astronomy 4 ....(94,96)...	3 hours
Stereotomy....(100).....	2 hours

Inspection Trips

Field and Laboratory Work following Commencement

Total 17 hours

Junior Year, General Engineering, Option B

First Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
History 1....(54).....	2 hours
Applied Mechanics....(97).....	4 hours
Highways and Pavements....(102).....	4 hours
Chemical Laboratory 2....(63).....	3 hours
Topographical Surveying and Mapping....(97).....	3 hours
Summer Vacation Work	

Total 19 hours

Second Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
History 1....(54).....	2 hours
Elements of Law....(98).....	3 hours
Mechanics of Materials and Engineering Laboratory... (97)	5 hours
Electrical Machinery....(102).....	3 hours
Thermodynamics....(102).....	2 hours

 Total 18 hours
Third Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
History 1....(54).....	2 hours
Law of Property and Contract....(98).....	3 hours
Stresses and Graphical Analysis....(97).....	4 hours
Route Surveying....(100).....	3 hours
Hydraulics....(102).....	3 hours

Inspection Trips

Field and Laboratory Work following Commencement

 Total 18 hours
Junior Year, Sanitary Engineering*First Term*

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
Applied Mechanics....(97).....	4 hours
Chemical Laboratory 2....(63).....	2 hours
Highways and Pavements....(102).....	4 hours
Topographical Surveying and Mapping....(97).....	3 hours
Summer Vacation Work	

 Total 16 hours
Second Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	1 hour
Mechanics of Materials and Engineering Laboratory... (97)	5 hours
Kinematics and Machine Drawing....(100).....	3 hours
Electricity....(102).....	3 hours
Thermodynamics....(102).....	2 hours
Natural Perspective....(100).....	1 hour

 Total 16 hours

Third Term

Rhetoric 9....(53).....	1 hour
History 2....(55).....	2 hours
Stresses and Graphical Analysis....(97).....	4 hours
Hydraulics....(112).....	3 hours
Route Surveying....(100).....	3 hours
Spherical Trigonometry and Astronomy ....(94,96).....	3 hours
Stereotomy....(100).....	2 hours
Inspection Trips	
Field and Laboratory Work following Commencement	_____
Total	18 hours

Junior Year, Electrical Engineering*First Term*

Rhetoric 9....(53).....	1 hour
Seminar....(112).....	1 hour
History 2....(55).....	2 hours
Electrical Laboratory EE5....(113).....	2 hours
Direct Current Circuits and Apparatus EE2 ....(113)....	3 hours
Hydraulics ME1....(112).....	3 hours
Applied Mechanics	4 hours
Descriptive Chemistry 2....(63).....	2 hours
Summer Vacation Work	
Total	18 hours

Second Term

Rhetoric 9....(53).....	1 hour
Seminar....(112).....	1 hour
History 2....(55).....	2 hours
Electrical Laboratory EE5....(113).....	2 hours
Direct Current Circuits and Apparatus EE2..(113).....	3 hours
Hydraulics ME1....(112).....	2 hours
Heat Engines ME2....(112).....	3 hours
Alternating Current Circuits and Apparatus EE3....(113)	3 hours
Physical Chemistry	3 hours
Total	20 hours

Third Term

Rhetoric 9....(53.).....	1 hour
Seminar....(112).....	1 hour
History 2....(55).....	2 hours
Electrical Laboratory EE6....(114).....	2 hours
Mathematics EE1....(113).....	1 hour
Electrical Apparatus Design EE8....(114).....	3 hours
Elements of Civil Engineering CE1....(112).....	2 hours
Heat Engines ME2....(112).....	2 hours
Alternating Current Circuits and Apparatus EE3....(113)	3 hours
Electric Lighting EE11....(115).....	3 hours
Total	20 hours

Senior Year, General Engineering, Option A*First Term*

Economics 3....(58).....	3 hours
Railroad and Trolley Road Construction....(101).....	5 hours
Engineering Stresses....(101).....	4 hours
Economic Geology 8....(66).....	2 hours
Motors and Motive Power....(102).....	2 hours
Engineering Mathematics.....	2 hours
One Literary Essay	
One Technical Essay	
Inspection Trips	
Summer Vacation Work	
Total	18 hours

Second Term

Sanitary Biology 4....(65).....	2 hours
Method of Least Squares....(101).....	3 hours
Engineering Design and Construction....(101).....	4 hours
Water Supply Engineering....(101).....	3 hours
Motors and Motive Power....(102).....	3 hours
Engineering Mathematics.....	2 hours
Building Construction....(101).....	2 hours
One Literary Essay	
One Technical Essay	
Total	19 hours

Third Term

Engineering Law and Procedure....(98).....	3 hours
Geodesy and Field Astronomy....(101).....	3 hours

Outlines of Architecture.....	2 hours
Engineering Design and Construction....(101).....	4 hours
Water Supply Sewerage and Sewage Disposal....(109)...	5 hours
Thesis	
	Total 17 hours

Senior Year, General Engineering, Option B

First Term

Economics 1....(58).....	3 hours
Comparative Politics 4....(55).....	3 hours
Principles and Laws of Corporations....(98).....	3 hours
Motors and Motive Power ....(102).....	2 hours
Engineering Stresses....(101).....	4 hours
Engineering Mathematics.....	2 hours
Economic Geology 8....(66).....	2 hours
One Literary Essay	
One Technical Essay	
Inspection Trips	
Summer Vacation Work	
	Total 19 hours

Second Term

Economics 2....(58).....	3 hours
Comparative Politics 4....(55).....	3 hours
Principles of Finance and Financial Operations....(102)..	2 hours
Motors and Motive Power....(102).....	3 hours
Engineering Mathematics.....	2 hours
Engineering Design and Construction....(101).....	4 hours
Building Construction....(101).....	2 hours
One Literary Essay	
One Technical Essay	
	Total 19 hours

Third Term

Economics 2....(58).....	3 hours
International Law 4....(55).....	3 hours
Principles of Administration....(102).....	3 hours
Engineering Design and Construction....(101).....	4 hours
Outlines of Architecture.....	2 hours
Principles of Accounting....(102).....	3 hours
Thesis	
	Total 18 hours

Senior Year, Sanitary Engineering

First Term

Motors and Motive Power....(102).....	2 hours
Engineering Stresses....(97).....	4 hours
Heating and Ventilation....(109).....	3 hours
Chemical Laboratory 5....(64).....	3 hours
Economic Geology 8....(66).....	2 hours
Economics 1....(58).....	3 hours
One Literary Essay	
One Technical Essay	
Inspection Trips	
Summer Vacation Work	

Total 17 hours

Second Term

Motors and Motive Power....(102).....	3 hours
Engineering Design and Construction....(101).....	4 hours
Water Supply Engineering....(108).....	2 hours
Chemical Laboratory 5....(64).....	2 hours
Sanitary Biology 4....(65).....	2 hours
Electives....(85).....	3 hours
One Literary Essay	
One Technical Essay	
Inspection Trips	

Total 16 hours

Third Term

Engineering Law and Procedure....(98).....	3 hours
Engineering Design and Construction....(101).....	5 hours
Sewerage and Sewage Disposal.....(109).....	5 hours
House Draining and Plumbing....(109).....	1 hour
Sanitary Codes and Laws....(98).....	1 hour
Electives....(85).....	2 hours
Thesis	

Total 17 hours

Senior Year, Electrical Engineering

First Term

Economics 3....(58).....	3 hours
Electrical Laboratory EE7....(114).....	2 hours
Electrical Engineering Theory EE18....(117).....	2 hours

Electrical Transmission and Generation EE14....(116)...	3 hours
Electrical Apparatus Design EE9....(115).....	2 hours
Engineering Mathematics	2 hours
Logic 1....(56).....	3 hours
Alternating Current Circuits and Apparatus EE4....(113)	3 hours
One Literary Essay	
One Technical Essay	
Summer Vacation Work	
	Total 20 hours

Second Term

Electric Railways EE15....(116).....	3 hours
Electrical Laboratory EE7....(114).....	2 hours
Electrical Engineering Theory EE18....(117).....	2 hours
Transmission and Distribution EE14....(116).....	3 hours
Electrical Apparatus Design EE9....(115).....	2 hours
Engineering Mathematics	2 hours
Electrical Engineering Practice EE17....(116).....	2 hours
Alternating Current Circuits and Apparatus EE4....(113)	4 hours
One Literary Essay	
One Technical Essay	
	Total 20 hours

Third Term

Engineering Law and Procedure ....(98).....	3 hours
Electrical Engineering Theory EE18....(117).....	2 hours
Transmission Calculations EE14....(116).....	3 hours
Electrical Apparatus Design EE9....(115).....	3 hours
Technical Literature EE12....(115).....	2 hours
Electrical Engineering Practice EE17....(116).....	2 hours
Thesis EE19....(117).....	5 hours
	Total 20 hours

Six-Year Course Leading to Degree of B.E. and Ph.B**First Year, B.E.-Ph.B.***First Term*

Fr	Latin	1s.....	4 hours
Fr	French or German.....	1s, e.....	3 hours
Fr	Rhetoric.....	1s, e.....	2 hours
Fr	Algebra.....	e.....	4 hours

Fr	Freehand Drawing.....e.....	3 hours
Fr	Physiology.....ls, e.....	1 hour
	Lectures	
	Summer Vacation Work	
		Total 17 hours

Second Term

Fr	Latin.....ls.....	4 hours
Fr	French or German.....ls, e.....	3 hours
Fr	Rhetoric.....ls, e.....	2 hours
Fr	Analytic Geometry.....e.....	4 hours
Fr	Mensuration.....e.....	2 hours
Fr	Physiology.....ls.....	1 hour
Fr	Gymnasium.....ls, e.....	1 hour
	Lectures	
		Total 17 hours

Third Term

Fr	Latin.....ls.....	4 hours
Fr	French or German.....ls, e.....	3 hours
Fr	Rhetoric.....ls, e.....	2 hours
Fr	Analytic Geometry.....e.....	2 hours
Fr	Calculus.....e.....	3 hours
Fr	Physiology.....ls, e.....	1 hour
Fr	Surveying.....e.....	2 hours
		Total 17 hours

Second Year, B.E.-Ph.B.*First Term*

So	Latin.....ls.....	3 hours
Fr	German or French.....ls, e.....	3 hours
So	English and Rhetoric.....ls.....	2 hours
So	Calculus.....e.....	3 hours
So	Surveying.....e.....	2 hours
So	Chemistry.....ls, e.....	3 hours
So	Hygiene.....s, e.....	1 hour
	Summer Vacation Work	
		Total 17 hours

Second Term

So	Latin.....ls.....	3 hours
Fr	German or French.....ls,e.....	3 hours
So	English and Rhetoric.....ls.....	3 hours
So	Calculus.....e.....	3 hours
So	Chemistry.....ls, e.....	3 hours
Fr	Mechanical Drawing.....e.....	3 hours
Total		18 hours

Third Term

So	Latin.....ls.....	3 hours
Fr	German or French.....ls, e.....	3 hours
So	English and Rhetoric.....ls.....	3 hours
So	Calculus.....e.....	2 hours
So	Chemistry.....e.....	5 hours
Fr	Trigonometry.....e.....	1 hour
Total		17 hours

Third Year, B.E.-Ph.B.*First Term*

So	German or French.....ls, e.....	3 hours
So	Physics.....e.....	3 hours
Jr	English and Rhetoric.....ls.....	3 hours
Jr	Chemical Laboratory.....e.....	3 hours
So	English History.....ls.....	2 hours
So	Mechanics.....e.....	3 hours
Summer Vacation Work		
Total		17 hours

Second Term

So	German or French.....ls, e.....	3 hours
So	Physics.....e.....	4 hours
Jr	English and Rhetoric.....ls.....	3 hours
So	Descriptive Geometry.....e.....	3 hours
So	English History.....ls.....	2 hours
So	Mechanics.....e.....	2 hours
Total		17 hours

Third Term

So	German or French.....ls, e.....	3 hours
So	Physics.....e.....	4 hours
Jr	English and Rhetoric.....ls.....	3 hours
So	Descriptive Geometry.....e.....	3 hours
So	French History.....ls.....	2 hours
So	Mechanics.....e.....	1 hour
So	Topographical Surveying.....e.....	3 hours
Total		19 hours

Fourth Year, B.E.-Ph.B.*First Term*

Jr	Applied Mechanics.....e.....	4 hours
Jr	Topographical Surveying.....e.....	5 hours
Jr	Logic.....ls.....	3 hours
E Jr	American History.....ls.....	3 hours
Jr	Biology.....ls.....	3 hours
Summer Vacation Work		
Total		18 hours

Second Term

Jr	Thermodynamics.....e.....	2 hours
Jr	Mechanics of Materials and Engineering Laboratory.....e.....	5 hours
Jr	Psychology.....ls.....	3 hours
E Jr	American History.....ls.....	3 hours
Jr	Biology.....ls.....	3 hours
Jr	Natural Perspective.....e.....	1 hour
So	Electrical Laboratory.....e.....	1 hour
Total		18 hours

Third Term

Jr	Stresses.....e.....	4 hours
Jr	Hydraulics.....e.....	3 hours
Jr	Ethics.....ls.....	3 hours
E Jr	American History.....ls.....	3 hours
Jr	Biology.....ls.....	3 hours
So	Electrical Laboratory.....e.....	1 hour
Total		17 hours

Fifth Year, B.E.-Ph.B., Option A

First Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	3 hours
Sr	Economics.....ls, e.....	3 hours
Sr	Stresses.....e.....	4 hours
Sr	Motors and Motive Power.....e.....	2 hours
Sr	Rhetoric.....ls.....	1 hour
E Jr	General Geology.....ls.....	3 hours
Summer Vacation Work		

Total 19 hours

Second Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	3 hours
Sr	Sociology.....ls.....	3 hours
Jr	Kinematics and Machine Drawing.....e.....	3 hours
Sr	Motors and Motive Power.....e.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Electrical Machinery.....e.....	3 hours

Total 19 hours

Third Term

E Sr	European History.....ls.....	3 hours
E Sr	International Law.....ls.....	3 hours
Sr	Sociology.....ls.....	3 hours
Jr	Route Surveying.....e.....	3 hours
Jr	Spherical Trigonometry and Astronomy.....e.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Stereotomy.....e.....	2 hours

Total 18 hours

Fifth Year, B.E.-Ph.B., Option B

First Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	2 hours
Sr	Economics.....ls, e.....	3 hours
Sr	Rhetoric.....ls.....	1 hour

Jr	Elements of Law.....e.....	1 hour
Sr	Stresses.....e.....	4 hours
Sr	Economic Geology.....e.....	2 hours
Sr	Motors and Motive Power.....e.....	2 hours
	Summer Vacation Work	
	Total	18 hours

Second Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	2 hours
Sr	Economics.....ls.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Elements of Law.....e.....	2 hours
Jr	Electrical Machinery.....e.....	3 hours
Sr	Motors and Motive Power.....e.....	3 hours
	Total	17 hours

Third Term

E Sr	European History.....ls.....	3 hours
E Sr	International Law.....ls.....	2 hours
Sr	Economics.....ls.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Law of Property and Contracts .e.....	3 hours
Jr	Route Surveying.....e.....	3 hours
Jr	Stereotomy.....e.....	2 hours
	Total	17 hours

Sixth Year, B.E.-Ph.B., Option A*First Term*

Sr	Railroad and Trolley Construc- tion and Economy.....e.....	6 hours
Sr	Principles of Aesthetic Design.....	3 hours
Jr	Elements of Law.....e.....	1 hour
Sr	Economic Geology.....e.....	2 hours
Jr	Highways and Pavements.....e.....	3 hours
	Total	15 hours

Second Term

Sr	Engineering Design.....e.....	4 hours
Sr	Water Supply.....e.....	2 hours
Sr	Building Construction.....e.....	2 hours

Jr	Elements of Law.....e.....	2 hours
Sr	Least Squares.....e.....	3 hours
Sr	Bacteriology.....	<u>3 hours</u>
		Total 16 hours

Third Term

Sr	Outlines of Architecture.....e.....	2 hours
Sr	Engineering Design.....e.....	4 hours
Sr	Water Supply and Sewerage...e.....	5 hours
Jr	Law of Property and Contracts.e.....	3 hours
Sr	Geodesy and Field Astronomy..e.....	<u>3 hours</u>
Thesis		
		Total 17 hours

Sixth Year, B.E.-Ph.B., Option B*First Term*

Sr	Railroad and Trolley Construc- tion and Economy.....e.....	6 hours
Sr	Principles of Law of Corpora- tions.....e.....	3 hours
Sr	Principles of Aesthetic Design.....	3 hours
Jr	Highways and Pavements.....e.....	<u>3 hours</u>
		Total 15 hours

Second Term

Sr	Engineering Design.....e.....	4 hours
	Engineering Projects.....	4 hours
Sr	Principles of Finance and Financial Operations.....e.....	2 hours
Sr	Building Construction.....e.....	2 hours
Sr	Bacteriology.....	<u>3 hours</u>
		Total 15 hours

Third Term

Sr	Outlines of Architecture.....e.....	2 hours
Sr	Engineering Design.....e.....	4 hours
Sr	Water Supply and Sewerage...e.....	5 hours
Sr	Principles of Accounting.....e.....	3 hours
Sr	Principles of Administration...e.....	<u>3 hours</u>
Thesis		
		Total 17 hours

ATTENDANCE AND STANDING

Registration. Every student must report at the registrar's office at the beginning of each term and register college or local residence.

Any change of residence during the term must be reported at once at the treasurer's office.

Changes of Course. Students are not permitted to pass from one course to another, or to take any studies out of their regular order, without the specific authorization of the faculty.

Chapel. Morning worship is held in the chapel every college day and attendance is required of all students.

Reports. A daily record of scholarship and of attendance at class and chapel is kept and a report is sent at the close of each term, or more frequently, to the student's parent or guardian.

Standing. There are four grades of scholarship:—from 9 to 10 inclusive, first grade; from 8 to 8.9, second grade; from 7 to 7.9, third grade; from 6 to 6.9, fourth grade. A student who receives a mark of 4 to 5.9 is reported as conditioned; below 4, as failed. In the mathematical studies of the engineering course the sustaining mark is 7, and any mark below 5 indicates failure.

A student who is reported as having failed in any subject must take that subject again in class; or he may be required, at the option of the department concerned, to make up the subject under an approved tutor, in such manner as the department may designate, and to pass an examination in it at the second conditions examination after the imposition of the mark of failure.

Those receiving the highest marks for the whole course are entitled to appointment as commencement orators, five places being assigned to students in the academic courses and five to students in the engineering courses.

Absences in General. Absences are entered, in every course, against a student from the beginning of a term until he reports his return to the registrar.

Absences are recorded as of two kinds:—excused and unexcused.

Excuses must be obtained from the committee on absences, which meets every Monday afternoon from two to five o'clock.

Class-room Absences. Attendance at all exercises is required and it is expected that no student will be absent except in case of unavoidable necessity.

Applications for excuses must be made to the committee on absences the first Monday following the date of absence.

No excuse remits any work of the term. The work lost by reason of excused absence must be made up in a manner satisfactory to the head of the department concerned, unless the nature of the work renders this impossible, in which case the student's grade will suffer.

After a number of unexcused absences equal to three weeks of recitations in any subject, the student is not allowed to continue his work in that subject, but must take it with the succeeding class.

Chapel Absences. Twelve absences without excuse are allowed each term. All absences after the first twelve lower the standing at the rate of one unit for every two absences.

No absences are excused except for protracted illness or for reasons in every way exceptional.

Applications for excuse from chapel for a term must be made within the first two weeks of that term.

In the determination of a student's general standing, marks for chapel attendance are counted as the equivalent of a one hour per week recitation. They affect the granting of scholarships and the selection of honor men.

Conditions. Students who may be admitted with entrance conditions must remove them not later than the March examinations. Those who fail to meet this requirement are classed as irregular students. Those who fail to remove all entrance conditions before the beginning of the next college year will not be admitted to any of the work of that year. No student who has any conditions unsatisfied at the close of the conditions examinations in September at the opening of the college year, is permitted to continue with his class without the express authorization of the faculty.

Conditions not removed at the next conditions examination held after their imposition must be made up in class at the first opportunity, and this work takes precedence of the regular work in case of conflict in the schedule. No senior who has failed to make up all his back work by the end of the second term of senior year can be recommended for a degree, except by special vote of the faculty.

Examinations for the removal of conditions occur on the Saturday next preceding the opening of the fall term, and on the first Saturday in December, March and May, as indicated in the college calendar. Registration for these examinations closes at 12 M. on the Saturday next preceding the date set for each. A fee for each examination to be taken must be paid at the time of registration, at the college office.

Students who have been excused by the dean, in writing, from any term examination are reported "Not examined" and may be examined later, at a time to be approved by the instructor, but such examination cannot be postponed beyond the first conditions examinations after such report. A failure to pass is regarded as a condition and must be made up at the next following conditions examination.

Unless excused in writing by the dean, students absent from term examinations are reported as "Not sustained," or "Failed."

Any student permitted by the faculty to anticipate or defer a term examination is required to pay a fee for each special examination made necessary.

A failure to report at any appointed examination is regarded as a trial, unless previously excused.

Irregular Students. Students who are seriously deficient in standing may be dropped to a lower class, or if the deficiency is such as to leave a prospect of regaining class standing, may be rated as irregular students. Irregular students have no class relation or class privilege; they are debarred from competition for prizes and from the attainment of special honors.

The evidence that a student's continuance in college is resulting in no advantage to himself, or in harm to others, will occasion his separation from the institution.

EXPENSES

Registration fee	\$5.00
Tuition, A. B., Ph. B. and B. S. courses, per term.....	30.00
Tuition, engineering courses, per term.....	50.00
Graduate courses in engineering, per term.....	50.00
Room rent in dormitories, per term.....\$20 to	25.00
Incidental fee, for maintenance of grounds and public rooms, use of library, gymnasium, etc., per term....	8.00
Graduation fee, including diploma.....	15.00
Chemical laboratory fees:	
Required course No. 1, or No. 1a, per term.....	8.00
Required course No. 2, fall term.....	15.00
Required course No. 2a, per term	15.00
Required course No. 5, fall and winter terms, per term	15.00
Elective course No. 1a, per term.....	8.00
Elective course No. 2a, No. 3, No. 4, per term.....	15.00
Electrical laboratory fee:	
Junior year, per term.....	7.00
Senior year, per term.....	10.00
Biological laboratory fees:	
Required course No. 1, per term.....	2.00
Required course No. 5, per term.....	3.00
Elective courses No. 2 or No. 3, per term.....	6.00
Physics laboratory fees:	
Required course No. 2, per term.....	4.00
Elective course No. 1a, per term.....	5.00
Conditions examination fee.....	2.00
Fee for certificate of work done.....	2.00
Fee for certificate of graduation.....	1.00
Master's degree, registration and diploma.....	20.00

The tuition fees named will be in force for classes entering in and after 1911. For classes which entered before that year the rates of \$25 and \$40 will be continued. In the course leading

to the degree of Doctor of Philosophy the maximum payment will be \$300 if the degree be earned in five years from the time of registration.

Students who take their senior year's work at the Albany Medical College as provided on page 3, are charged \$125 for the year's tuition, \$50 to be paid to the treasurer of Union College and \$75 to the treasurer of the Albany Medical College.

Tuition and other fees are due on the first day of each term.

Students must conform to the rules of the treasurer's office regarding registration at the opening of each term, and will not be admitted to any classes or laboratories until the required fees are paid.

No deductions are made because of absence from college.

No part of a term bill will be refunded for any cause.

Damage done by students to college property will be charged to their account.

No degree, certificate or dismissal will be given to any student until his bills are paid.

Board can be procured for \$3.50 to \$5 a week.

It is the custom of the student body to levy an annual campus tax of twelve dollars, six dollars of which is payable at the beginning of the fall term, three dollars at the beginning of the winter term, and three dollars at the beginning of the spring term. This money is used for the support of the different branches of athletics and of the musical association.

College Rooms

The college has two steam-heated dormitories, accommodating one hundred students. Most of the rooms are arranged in suites of two, and all are unfurnished; they are rented at prices varying from \$60.00 to \$75.00 per year for each student occupying a room. Students about to enter college who wish rooms in the dormitories should make early application to the assistant treasurer for a list of rooms giving location and price. No room is secured until a lease is signed and filed in the college office; a student must occupy the room for which he signs, as transfers are not allowed. The rooms are cared for by competent persons, employed and paid by the college; each occupant of a college room will be held responsible for any damage done to

the room. At the end of the college year students giving up their rooms for any reason whatsoever must remove all furniture and property from their rooms not later than the Saturday following commencement day, as after this time the dormitories will be closed until the Saturday before the first registration day of the fall term. The dormitories will also be closed during the Christmas recess.

Students leaving property in their rooms during the vacations do so at their own risk.

The Union College Christian Association offers its services to students who find it necessary to secure rooms in the city. The association inquires into the character of all places offered as lodgings for students, and, shortly before the beginning of the college year, provides a list of approved places.

Employment Bureau

The Christian Association acts as a bureau with the object of giving assistance to students who desire employment for the purpose of meeting the expenses of a college education. It has been found that many opportunities for work exist in Schenectady by which students may earn from \$2 to \$4 per week, during term-time, without seriously interfering with their college studies. A considerable number of students meet the expense of board by acting as waiters in the various restaurants and boarding houses in the city. Others find employment as clerks in stores on Friday evenings and Saturdays; others in caring for furnaces and in other work about private residences. Applications for the assistance of the bureau may be addressed to the secretary of the faculty.

SCHOLARSHIPS

Funds given especially for this purpose enable the college to offer aid to a number of students each year, as follows:

General Scholarships

Available for students in the A. B., Ph. B. and B. S. courses.

Scholarships covering a part or the whole of tuition charges are granted to students upon the following conditions:

1. The declaration of a purpose to remain in Union College until graduation.
2. An acknowledgment that the aid received is regarded as a debt of honor, to be paid as soon as possible after leaving college.
3. The presentation of satisfactory evidence of financial need.

Scholarship aid will be withdrawn temporarily upon the failure of the student to be sustained in any subject, or upon his failure to maintain an average grade of eighty per cent. in the studies of any term, and after it has been withdrawn for three successive terms it will not be renewed.

Any serious breach of college discipline, evidence of moral delinquency, or repeated unnecessary expenditures will also result in the withdrawal of scholarship aid.

Credentials necessary for admission to another college will not be given to any scholarship student until he has repaid to the college treasury the full amount of scholarship aid received.

Application blanks will be provided by the president or by the dean upon request.

John David Wolfe Memorial Scholarships

The income of a fund of fifty thousand dollars established by the generosity of Miss Catharine Lorillard Wolfe is designed to aid students from the southern states.

These scholarships are available for students in all courses and are governed by the conditions named above.

Application blanks will be provided by the president or by the dean upon request.

Levi Parsons Scholarships

A generous benefaction by the late Hon. Levi Parsons, of Gloversville, N. Y., maintains several scholarships in each class, yielding at least one hundred and fifty dollars a year, each.

All scholarships begin at the rate of one hundred and fifty dollars a year. After the first term the value of the scholarship depends upon the standing of the student.

Scholarships of \$300 a year are granted to students who have had, in the preceding term, an average grade of 90 per cent. or more.

Scholarships of \$200 a year are granted to students who have had, in the preceding term, an average grade of 85 per cent. or more.

Scholarships of \$150 a year are continued to students who have had, in the preceding term, an average grade of 80 per cent. or more.

Among applicants, preference is given:

First, to blood relatives of the founder, bearing his name and living in the county of Fulton, Montgomery or Hamilton, in the State of New York, and especially to those bearing his name and living in Gloversville or Johnstown, Fulton county.

Second, to applicants living in the following places, according to the following order:

1. The city of Gloversville, Fulton county.
2. The city of Johnstown.
3. The township of Johnstown.
4. The county of Fulton.
5. The adjoining counties of Montgomery and Hamilton.
6. To blood relatives living in any other part of the United States.

Nomination to scholarships is made by the board of directors of the Gloversville Free Library; and the nominees must satisfy the college requirements for admission. Applications are received by the directors of the Gloversville Free Library, Gloversville.

The continuance of these scholarships is subject to the rules stated on page 146, concerning the withdrawal of the general scholarships of the college.

Thomas Armstrong Scholarships

The late Thomas Armstrong of Plattsburg, N. Y., provided for the grant of scholarships to residents of Clinton county, sons of practical farmers.

Nominations to these scholarships are made by the board of supervisors of Clinton county, and the yearly value of each scholarship is not to exceed two hundred dollars.

R. C. Alexander Prize Scholarship

The sum of four thousand dollars has been given in memory of the late Robert Carter Alexander, of the class of 1880, and a life trustee of the College, to be devoted to the establishment of a scholarship for the encouragement of classical studies.

The income of this fund, amounting to two hundred dollars per year, is awarded as a prize scholarship, upon the following conditions:

1. Candidates must be students in the classical course, and of approved moral character.
2. They must be free from conditions and must have obtained an average of at least eighty per cent. in the studies of the first two terms of the freshman year.
3. They must pass successfully a special examination at the close of the freshman year in each of the following subjects: Latin, Greek, Mathematics, English composition, and either French or German. These examinations will be based upon the work of the freshman year.
4. The award will be made to the candidate obtaining the highest general average in these examinations and in all the previous work of his college course.*
5. The prize scholarship will be forfeited upon evidence of moral delinquency, or upon failure to maintain an average grade of ninety per cent. in the work of any subsequent term. The scholarship, once lost, cannot be regained, but will be awarded, upon the above conditions, to a student in the next entering class.
6. All questions pertaining to the administration of this

*This scholarship is now held by Chauncey Holmes Winters, of the class of 1912.

scholarship will be determined by a committee composed of the president of the college, the chairman of the scholarship committee of the faculty, and a member of the board of trustees.

Horace B. Silliman Scholarship

Three scholarships were founded by the late Horace B. Silliman, of the class of 1846, giving to each recipient the income from two thousand dollars (\$2,000) annually.

These scholarships are awarded to active members of the college Young Men's Christian Association by a committee composed of the president, the dean, and the president of the Young Men's Christian Association, under such rules and conditions as may be determined by such committee, preference being given to students in the classical course.

The award is made to one student annually at the close of the freshman year.

Daniel F. Pullman Scholarship

The late Daniel F. Pullman, of Knox, Albany County, New York, provided in his will for the establishment of a scholarship of the value of \$120 a year, to be given to a student in the classical course.

The award is made by the faculty, and in accordance with the terms of the will preference is given to members of the Methodist Episcopal Church.

Class of 1895 Scholarship

A fund has been given by the class of 1895 which provides for the grant of a scholarship of a yearly value not to exceed one hundred dollars.

The award is made by the faculty and, in accordance with the wish of the donors, preference will be given to descendants of members of the class.

Application for appointment to this scholarship must be made annually before September 1.

The conditions with respect to college standing governing the award of the general scholarships of the college apply to this scholarship also.

Daniel Vedder Scholarship

By the will of the late Daniel Vedder, of Schenectady, a scholarship has been established, of the annual value of two hundred dollars.

The scholarship is awarded by the faculty, and is given to a student who is preparing to enter the Christian ministry.

The holder must maintain an average standing of ninety per cent., and must pledge himself to abstain from the use of intoxicating liquors and tobacco.

If none of the candidates meets in every respect the conditions stated in the will of the donor, the scholarship will be awarded in such a way as to carry out as fully as possible the wishes of the founder.

The award is made at the end of the freshman year.

Law School Scholarships

Applicants for these scholarships, described below, must register at the college office by May 1st of senior year.

John K. Porter Memorial Scholarship

A fund given by Mrs. John K. Porter, in memory of her husband, is designed to assist students who, after graduating from college, pursue the study of law. The fund provides, at present, for three scholarships of ninety dollars each. The awards are made at commencement to seniors chosen by the faculty.

Gilbert M. Spier Memorial Scholarship

A fund given by Mrs. John K. Porter, in memory of her father, the late Judge Gilbert M. Speir, provides another scholarship for students of law who go from Union College to the Albany Law School, another department of Union University.

The sum of ninety dollars will be awarded at commencement to the senior chosen by the faculty, the choice being made on the basis of excellence in historical studies.

PRIZES

The following prizes are awarded from funds given especially for this purpose:

Blatchford Oratorical Medals

The Hon. Richard M. Blatchford, LL. D., of New York city, founded oratorical prizes, consisting of two gold medals of the value of the interest on \$1,000, which are given to the two members of the graduating class who deliver at commencement the best orations, "regard being had alike to their elevated and classical character and to their graceful and effective delivery." These medals are awarded by a committee appointed by the trustees, and are presented at the close of the exercises.

Warner Prize

The Hon. Horatio G. Warner, LL. D., of Rochester, N. Y., founded an annual prize to be presented at commencement to the "graduate of Union College, classical or Latin-scientific course, who shall reach the highest standing in the performance of collegiate duties, and also sustain the best character for moral rectitude and deportment, without regard to religious practice or profession." The prize is a silver cup and is awarded by the faculty.

Ingham Prize

The Hon. Albert C. Ingham, LL. D., of Meridian, N. Y., founded an annual prize of the interest of \$1,000 (in the form of plate, or medal, or money, or both medal and money, as preferred), to be awarded at commencement to that senior connected with the college for not less than two years who shall offer the best essay on one of two assigned subjects in English literature or history.

The essay must be typewritten, and must contain not less than 4,000 nor more than 4,500 words. Its signature (fictitious) and the writer's real name must be enclosed in a sealed envelope; the signature and the name of the prize being given on the outside. The essay, with the note, must be presented by noon on the fifteenth day of May.

Allen Essay Prizes

The Hon. William F. Allen, LL. D., of Oswego, N. Y., established a fund of \$1,000, the interest of which is devoted to prizes for the best three essays on any subject, submitted by members of the senior class.

The essay must be typewritten, and must contain not less than 2,500 nor more than 3,000 words, and must be signed and presented (with note, as in the case of the Ingham essay) by noon on May 15th. The prizes are awarded at commencement.

Oratorical Prizes

Prizes are presented at commencement to the two juniors and the two sophomores who deliver the orations best in composition and delivery on the occasion of prize speaking in commencement week. Four juniors and four sophomores are selected for this competition by a committee of the faculty on the fifteenth of April. Candidates must be in full standing on appearance before the committee.

Allison-Foote Prizes

Mr. George F. Allison, of New York city, and the late Wallace T. Foote, of Port Henry, N. Y., founded a prize for the encouragement of debate in the literary societies. The prize consists of \$100 in cash, and is to be awarded as the result of a public competition between representatives of the Adelpic and Philomathean Literary Societies. Fifty dollars will be awarded to the society presenting the strongest argument. The remaining \$50 will be awarded to the debater who makes the best single speech, regardless of his society relations. Contestants must have engaged in at least ten debates in their respective societies during the college year immediately preceding. All further details are left to the determination of a committee, consisting of the president, the dean of the college, and the professor of Rhetoric.

Daggett Prize

In 1899 Miss E. Josephine Daggett bequeathed to Union College the sum of \$1,000, the interest of which is devoted to a prize

for conduct and character, without respect to scholarship, to be given at Commencement to a senior who shall have passed through a full course of four years at the college.

Pullman Prizes

Mr. Daniel F. Pullman, of Knox, Albany County, New York, bequeathed to Union college the sum of \$2,000 to found two annual prizes.

The Pullman Classical Prize of \$40 is given to that member of the graduating class who, in an attendance of three years, has attained the highest standing in scholarship in the classical course.

The Pullman Engineering Prize of \$40 is given to that member of the graduating class who has taken the full course in the engineering department and who shall have attained the highest standing in that course.

In awarding both prizes, preference is given to members of the Methodist Episcopal Church.

Baggerly Prizes

Mr. H. L. Baggerly, of the class of 1894, has given one hundred dollars to be offered in two prizes for the best essays on an economic subject of his own selection. The prizes are of \$60 and \$40, and are open to competition by members of the senior and junior classes.

The subject assigned for the current year is a consideration of the single tax theory as presented in Henry George's *Progress and Poverty*.

The award is made by a committee of the faculty.

DEGREES AND HONORS

The candidate for a degree must have paid all dues to the college treasurer, and returned all books borrowed from the college library; he must also attend the conferring of degrees, or be expressly excused therefrom. The candidate for a bachelor's degree must have entered college before the end of the first senior term.

Degrees for Resident Study

The degrees of the college are conferred by authority of the board of trustees upon candidates who have successfully completed courses of resident study, as follows:

The Bachelor's Degree

The degree of Bachelor of Arts will be conferred upon candidates who have successfully completed Course 1, page 28; the degree of Bachelor of Philosophy, upon those who have successfully completed Course 2, page 28; the degree of Bachelor of Science, upon those who have successfully completed Course 3, page 28; the degree of Bachelor of Engineering, upon those who have successfully completed Course 4, first, third and fourth division, pages 28-29; the degree of Bachelor of Engineering and Bachelor of Philosophy, upon those who have successfully completed Course 4, second division, page 29.

The Master's Degree

The degree of Master of Civil Engineering will be conferred upon candidates who have successfully completed Course 5, first division, page 29; the degree of Master of Electrical Engineering upon those who have successfully completed Course 5, second division, page 29.

The Doctor's Degree

The degree of Doctor of Philosophy will be conferred upon students of electrical science who fulfill the requirements stated on page 123.

Degrees for Non-Resident Study

The degree of Master of Arts or of Master of Science will be given to graduates of Union College who have been registered

as candidates for the degree not less than two years, have completed definite courses of advanced study in two departments, and have submitted a satisfactory thesis and passed satisfactory examinations. The total amount of work done is intended to be the equivalent of one year of resident study.

A year of resident study in any non-professional graduate school, approved at the time of registration by the two departments concerned, will be accepted instead of the two years' study above mentioned on fulfillment of the same conditions regarding thesis and examinations.

Each candidate for this degree must register with the dean of the college his name, address, and the two departments chosen, not later than the fifteenth of October of the year for which he desires registration.

The thesis must be presented to the dean by May first for submission to the faculty in time to provide for all necessary examinations before commencement.

A fee of \$20 is charged, which covers examinations and diploma; of this amount \$10 is payable at the time of registration and \$10 at the time of the final examinations.

Honors

All commencement prizes are limited to A. B., Ph. B. or B. S. students who have entered at or before the beginning of the senior year, and who are in full standing at the close of the second term; and to engineering students entered likewise and in full standing at the close of the second term, in both the engineering course and the English department of the B. S. or Ph. B. course.

Commencement Appointments

These honors are assigned to ten seniors, five from the academic courses and five from the engineering courses, on the basis of scholarship, as stated under Standing, page 140. Provisional appointments are made at the close of the second term senior, and become final if those who receive them retain the same relative rank to the end of their course. Under present regulations, no other persons can become competitors for the Blatchford Oratorical Medals.

Seniors not in full standing at the close of the second term are ineligible to a Commencement appointment.

Students who receive Commencement appointments as the result of the third term's work are excused from speaking unless the faculty direct otherwise.

The Valedictory

This honor is awarded to the senior of highest standing among the ten receiving Commencement appointments.

Special Honors

Special honors are also given at graduation in each of the following subjects: Greek, Latin, English language, English literature, French, German, mathematics, physics, chemistry, biology, economics, history, sociology and philosophy. The work required in each case will be equivalent of three terms of classroom work of two hours per week each, and will be in addition to the prescribed and elective courses. The candidate for special honors must apply to the head of the department in which he proposes to take honors not later than the first Monday of the spring term of the junior year. He must have attained in all the studies of the department in which he tries for honors a rank of not less than ninety per cent. of the maximum. The evidence that he has successfully completed the extra course prescribed for him must be submitted not later than June 1st of the senior year to the faculty, who shall decide in each case whether the work done is worthy of an honor. The honors attained are stated in the diploma and the names of the students who take honors are printed on the Commencement programme.

Phi Beta Kappa Society

At the end of the third term of the senior year, one-third of the members of the graduating class in the classical course, candidates for the degree of Bachelor of Arts, may be elected to membership in the Phi Beta Kappa Society. The election is based upon scholarship and character and is given as a rule, to the men who stand highest in scholarship in their class.

The Alpha of New York chapter was established in 1817;

and ever since that time election to the society has been one of the highest distinctions to be gained by scholarship.

Sigma Xi

Election to the honorary scientific society of Sigma XI, is one of the honors open to seniors of marked ability in the scientific and engineering departments. Membership is confined to the faculty, senior candidates for graduation, and alumni. The election occurs during the latter part of the senior year and selections are made on the basis of high general scientific or engineering ability and particularly as a mark of promise of ability in research and independent work.

The society was founded at Cornell University in 1886 and has chapters at more than twenty of the leading colleges and universities of the country. The Union chapter was established in 1887, since which time about one hundred members have been elected by this chapter.

DEGREES CONFERRED

AT THE

ONE HUNDRED AND FIFTEENTH ANNUAL
COMMENCEMENT

JUNE 14, 1911

Honorary

Sc. D.

Herman A. Metz.....Brooklyn
Morris Loeb.....New York City

L. H. D.

Jacob Fry.....Philadelphia, Pa
Charles S. Vedder.....Charleston, S. C.

LL. D.

William Henry Stele Demarest.....New Brunswick, N. J.
Rt. Hon. James Bryce.....England
*Joseph Price.....Philadelphia, Pa.

Litt. D.

Chester Holcomb.....Rochester

D. D.

Donald Mayo Brookman.....Albany
George Fairlee.....Troy
Lee W. Beattie.....New York City

In Course

A. M.

Henry Winne Bell.....New York City

M. E. E.

Frank William Peek.....Schenectady

*The degree of Doctor of Laws which was to have been conferred was registered in honor of the deceased surgeon.

B. E.

Arthur Lewis LaRoche.....Binghamton
(as of the class of 1908)

Chester Moore.....Amsterdam
(as of the class of 1910)

Class of 1911**A. B.**

Michael William Bray.....Churubusco
Walter Dudley Cavert.....Charlton
Tristram Coffin.....Hudson
Leo Augustine Hanigan.....Schenectady
Arthur Lyman Maxon.....Schenectady
Ransom Rathbone Micks.....Seneca Falls

Ph. B.

Harold Eugene Blodgett.....Schenectady
Otto Alois Faust.....Schenectady
Edward Joseph O'Connell.....Albany

B. S.

Thomas Gillespie Dunn.....Hadley
Bernard Alfin Gray.....Black River
Hans Huthsteiner.....Schenectady
Henry Berger Keckeley.....Charleston, S. C.
Charles Inslee Mohair.....Newton, N. J.
John Bancroft Odell.....Schenectady
Harry Stevens Reynolds.....Schenectady

B. E.

Anderson Allyn.....Holyoke, Mass.
Charles Gorsch Atkin.....East Orange, N. J.
George Bean Baker.....Yonkers
Harold Wallace Baker.....Oneida
Louis Ray Bennett.....Howard
Franklin Josephus Bowman.....St. Johnsville
Edward Henry Branson.....Coatesville, Pa.

Herman F. Brumm.....	Tonawanda
Charles Milton Canfield.....	East Orange, N. J.
Earl K. Dewey.....	Adams
Walter Robert Hamilton Dick.....	Schenectady
Eugene David Fink.....	Schenectady
George Merchant Fowler.....	Buffalo
Harold Jesse Goodman.....	Albion
Everett Keeler Hawley.....	Hartford, Conn.
John Sanders Hunter.....	Willimantic, Conn.
Gustave Huthsteiner.....	Schenectady
Neil Dutton Hyde.....	Afton
Strickland Kingston Hyde.....	Hackensack, N. J.
Theodore Schuyler Ingham.....	Little Falls
Willis Cary Lincoln.....	Schenectady
Manly Leonard Mackey.....	Cobleskill
Rufus B. McConnell.....	Buffalo
Stanley Congdon Miller.....	Elmira
Allen Adams Patterson.....	Glens Falls
Gilberto De Souza Ratto.....	Sao Paulo, Brazil
Lloyd Nash Robinson.....	Lockport
Robert Blanchard Shepard.....	Hudson
Howard Olwin Thorne.....	Yonkers
John Archibald Hyde Torry.....	Cooperstown
Squire Vernon Travis.....	Hale Eddy
Fremont L. Van Patten.....	Duanesburg
Charles Leland Wood.....	Herkimer

AWARDS

Valedictory

Leo A. Hanigan.....Schenectady

Commencement Orations

M. William Bray.....Churubusco
 Walter D. Cavert Charlton
 Otto A. Faust Schenectady
 Arthur L. Maxon.....Schenectady
 Leo A. Hanigan.....Schenectady

Engineering Theses

Lloyd N. Robinson.....Lockport
 Harold W. Baker.....Oneida
 Louis R. Bennett.....Howard
 Manly L. Mackey.....Cobleskill
 Allen A. Patterson.....Glens Falls

Special Honors

In English.....Harold E. Blodgett
 In Mathematics.....Arthur L. Maxon

Warner Prize

Leo A. Hanigan

Ingham Prize

Leo A. Hanigan

Allen Prizes

1st. Ransom R. Micks
 2nd. Walter D. Cavert
 3rd. Leo A. Hanigan

Extemporaneous Debate Prizes

Roy Peters
Class of 1912
Kenneth Walser
Class of 1912

Prizes for Oratory**Juniors**

Raymond D. Shepard
A. Winfield Trainor

Sophomores

Theodore W. Hanigan
Norman A. Davis

Allison-Foote Prizes

Won by the Philomathean Society
and
James H. Potter

Blatchford Oratorical Medals

1st. Leo A. Hanigan
2nd. Walter D. Cavert

Daggett Prize

Harold W. Baker

Pullman Prizes

Leo A. Hanigan
Lloyd N. Robinson

John K. Porter Memorial Scholarship

William Bray
Tristram Coffin
Edward T. O'Connell

Gilbert M. Speir Memorial Scholarship

Harold E. Blodgett

Horace B. Silliman Scholarship

Raymond D. Shepard

Henry H. Hitchcock

Daniel Vedder Scholarship

James H. Potter

Phi Beta Kappa

Leo A. Hanigan

Arthur L. Maxon

Sigma Xi

Harold W. Baker

Louis R. Bennett

Arthur L. Maxon

Allen A. Patterson

Lloyd N. Robinson

S. Vernon Travis

ALBANY MEDICAL COLLEGE

The Medical College building, situated on Eagle street, Albany, is well appointed in its lecture rooms, laboratories, dissecting room and museums. The laboratories in chemistry and physiological chemistry are fitted with every requisite for the use of the classes and the illustration of the lectures, while the Bender Hygienic Laboratory furnishes unexcelled facilities for instruction in histology, pathology, bacteriology, experimental physiology and clinical microscopy.

The location of the college is such as to afford superior advantages to the student. The hospitals and dispensaries furnish an abundant supply of material for the illustration of clinical medicine and surgery, while the museums are especially rich in anatomical and pathological preparations.

The course of instruction is graded and extends over four years. The curriculum embraces lectures by professors and lecturers; recitations conducted mainly by instructors, and practical demonstrations, clinical teaching and laboratory work, in which the professors in the different departments are assisted by clinical assistants and demonstrators.

The Albany Hospital, St. Peter's Hospital, Child's Hospital, St. Margaret's House, Albany's Hospital for Incurables, County Hospital, South End Dispensary, Eye and Ear Infirmary, Albany Orphan Asylum and dispensaries connected with each are, by the regulation of their governing boards, made available for clinical purposes to the students, and appointments to positions on the house staffs of the Albany Hospital, and other hospitals in Albany and neighboring places, are annually made and are competed for by the members of the graduating class.

TRUSTEES

President

SIMON W. ROSENDALE

Vice-President

ALDEN CHESTER

Treasurer

(.....)

Secretary

CHARLES F. VAN BENTHUYSEN

CLARENCE RATHBONE
 JAMES D. WASSON
 OSGOOD H. SHEPARD
 AMASA J. PARKER
 J. TOWNSEND LANSING
 JESSE W. POTTS
 EDWARD A. DURANT
 CLIFFORD D. GREGORY
 EDWARD BOWDITCH

FREDERICK TOWNSEND
 WALTER L. PALMER
 CHARLES GIBSON
 LUTHER H. TUCKER
 EDWARD J. HUSSEY
 ROBERT C. PRUYN
 ROBERT OLCOTT
 JAMES B. McEWAN
 JOHN M. BIGELOW

CHARLES A. RICHMOND

MAYOR OF ALBANY }
 RECORDER OF ALBANY } EX-OFFICIO

Catalogues are sent with care, and graduates of the college changing their post-office address, or not receiving them, will please notify

WILLIS G. TUCKER, M. D., *Registrar*

ALBANY MEDICAL COLLEGE

Albany, New York

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor of the University

JOHN MILTON BIGELOW, M. D., PH. D.
Emeritus Professor of Materia Medica, Therapeutics and
Diseases of the Throat and Nose

WILLIAM HAILES, M. D.
Emeritus Anthony Professor of Pathological Anatomy, Histology
and Fractures and Dislocations

ALBERT VANDER VEER, M. D., PH. D., LL. D.
Professor of Surgery

SAMUEL BALDWIN WARD, M. D., PH. D.
Dean
Professor of Theory and Practice of Medicine

JAMES PETER BOYD, M. D.
Professor of Obstetrics and Diseases of Children

WILLIS GAYLORD TUCKER, M. D., PH. D.
Registrar
Professor of Chemistry and Toxicology

CYRUS STRONG MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC COLTON CURTIS, M. D.
Professor of Dermatology

HENRY HUN, M. D.
Professor of Diseases of the Nervous System

SAMUEL ROSEBURGH MORROW, M. D.
Professor of Practice of Surgery and of Orthopedic Surgery

HERMON CAMP GORDINIER, M. D.
Professor of Physiology

HOWARD VAN RENSSELAER, M. D.

Professor of Materia Medica and Therapeutics, and Adjunct
Professor of Theory and Practice of Medicine

JOSEPH DAVIS CRAIG, M. D.

Professor of Anatomy and Curator of the Museum

ANDREW MACFARLANE, M. D.

Professor of Physical Diagnosis and Medical Jurisprudence

ARTHUR GUERNSEY ROOT, M. D.

Professor of Diseases of the Throat and Nose

LEO HAENDEL NEUMAN, M. D.

Professor of Gastro-Enteric Diseases, and Clinical Professor of
Theory and Practice of Medicine

THOMAS ORDWAY, M. D.

Professor of Pathology and Bacteriology

ARTHUR WELLS ELTING, M. D.

Professor of the Practice of Surgery and of Clinical Surgery

EDGAR ALBERT VANDER VEER, M. D.

Professor of Abdominal and Clinical Surgery

JOHN ALBERTSON SAMPSON, M. D.

Professor of Gynecology

HERMAN BENDELL, M. D.

Clinical Professor of Otology

JESSE MONTGOMERY MOSHER, M. D.

Clinical Professor of Insanity, Neurology and Electro-
Therapeutics

HARRY JUDSON LIPES, M. D.

Clinical Professor of Obstetrics

ARTHUR SAUTTER, M. D.

Clinical Professor of Dermatology and Lecturer on Venereal
Diseases

GEORGE EMORY LOCHNER, M. D.

Clinical Professor of Gynecology

CLEMENT FRANK THEISEN, M. D.

Clinical Professor of Diseases of Throat and Nose

HENRY LARNED KEITH SHAW, M. D.

Clinical Professor of Diseases of Children

SPENCER LYMAN DAWES, M. D.

Adjunct Professor of Materia Medica

(.....)

Adjunct Professor of Physiological Chemistry and Experimental
Physiology

WILLIAM OLIN STILLMAN, M. D.

Lecturer on History of Medicine

CHARLES HENRY MOORE, M. D.

Lecturer on Ophthalmology and Otology

JAMES FRANCIS ROONEY, M. D.

Lecturer on Hygiene, and Instructor in Medicine

HOWARD EATON LOMAX, M. D.

Lecturer on Anatomy and Demonstrator of Anatomy

GEORGE GUSTAVE LEMPE, M. D.

Lecturer on Anatomy and Minor Surgery and Assistant
Demonstrator of Anatomy

LA SALLE ARCHAMBAULT, M. D.

Lecturer on Neurology

ARTHUR FENWICK HOLDING, M. D.

Lecturer on Radiography

WILLIAM ATWOOD LARKIN, PH. G.

Assistant Registrar

Lecturer on Inorganic Chemistry and Instructor in Organic
Chemistry

JAMES NEWELL VANDER VEER, M. D.

Lecturer on Surgical Technic and Instructor in Genito-Urinary
Surgery

ARTHUR JOSEPH BEDELL, M. D.

Lecturer on Ophthalmology

JAMES WESLEY WILTSE, M. D.

Lecturer on Dermatology and Genito-Urinary Diseases

HARRY SAUL BERNSTEIN, M. D.

Lecturer on Histology, Pathology and Bacteriology

JOHN HENRY GUTMANN, M. D.

Lecturer on Surgery and Obstetrics

JOSEPH LEWI DONHAUSER, M. D.

Lecturer on Surgical Diagnosis

ALVAH HARRY TRAVER, M. D.

Instructor in Surgery

EDGAR ROSCOE STILLMAN, M. D.

Instructor in Physiology

CHARLES KNICKERBACKER WINNE, JR., M. D.

Instructor in Theory and Practice of Medicine

JOSEPH ALOYSIUS LANAHAN, M. D.

Instructor in Dermatology and Venereal Diseases

GEORGE EVERETT BEILBY, M. D.

Instructor in Surgical Pathology

BRANSEN KEEMPER DEVOE, M. D.

Instructor in Anatomy

EUGENE EUNSON HINMAN, M. D.

Instructor in Diseases of Throat and Nose

MALCOLM DOUGLAS, M. D.

Instructor in Physical Diagnosis and Therapeutics

CLINTON BENJAMIN HAWN, M. D.

Instructor in Clinical Microscopy

ERASTUS CORNING, M. D.

Instructor in Theory and Practice, and Physical Diagnosis

LEROY SOLOMON BLATNER, D. D. S.

Instructor in Oral Pathology

WILLIAM KIRK, M. D.

Instructor in Anatomy and Physiology of the Nervous System

WALTER ANCEL REYNOLDS, M. D.

Prosector of Anatomy and Assistant Curator of Museum

JEROME MEYERS, M. D.

Instructor in Gastro-Enteric Diseases and Physical Diagnosis

RICHARD ANDREW LAWRENCE, M. D.

Instructor in Obstetrics

HAROLD PAYNE SAWYER, M. D.

Instructor in Clinical Microscopy

THEOBALD FREDERICK DOESCHER, M. D.

Instructor in Physiological Chemistry and Gastro-Enteric Diseases

NELSON KAUFMAN FROMM, M. D.

Instructor in Materia Medica

TIFFANY LAWYER, M. D.

Instructor in Gynecology

EDWIN LYON DRAPER, M. D.

Instructor in Surgery and Surgical Pathology, and Assistant
Demonstrator of Anatomy

WILLIAM GEORGE KEENS, M. D.

Instructor in Diseases of Throat and Nose

ELLIS KELLERT, M. D.

Instructor in Pathology and Bacteriology

HARRY HOUGHTON DRAKE, M. D.

Instructor in Anatomy

JOSEPH AMBROSE COX, M. D.

Instructor in Obstetrics

JOSEPH LEWI BENDELL, M. D.

Instructor in Surgery

THOMAS WILLIAMS JENKINS, M. D.

Assistant Instructor in Histology

CHARLES WILLIAM LOUIS HACKER, M. D.

Assistant Instructor in Pathology and Bacteriology.

WARDNER DANIEL AYER, M. D.

Assistant Instructor in Pathology and Bacteriology

WILLIAM DEWEY ALLEN, M. D.

Assistant Instructor in Pathology and Bacteriology

Clinical Assistants

WILLIAM H. GEORGE, M. D.	AGNES E. PAGE, M. D.
MICHAEL D. STEVENSON, M. D.	HARRY RULISON, M. D.
WASHINGTON I. GOEWEY, M. D.	RAY M. EATON, M. D.
ELIJAH HUDSON RIDER, M. D.	A. MARTINEZ ALVAREZ, M. D.
GEORGE W. PAPEN, JR., M. D.	WILLIAM E. FINDEISEN, M. D.
JOHN J. A. LYONS, M. D.	H. BURDETTE RIGGS, M. D.
WILLIAM GRANT LEWIS, M. D.	HENRY J. NOERLING, M. D.
MARTIN MACHARG, M. D.	RALPH B. POST, M. D.
LOUIS LEBRUN, M. D.	WALTER C. FOX, M. D.
JAMES MANNING MOORE, M. D.	HAROLD A. LUCAS, M. D.
GEORGE S. MUNSON, M. D.	ARTHUR E. WELLS, M. D.
JOSEPH P. O'BRIEN, M. D.	FREDERICK J. GARLICK, M. D.
MILES A. MCGRANE, M. D.	SCOTT B. SCHLEIERMACHER, M. D.
FREDERIC C. CONWAY, M. D.	FRANK M. NEUENDORF, M. D.
DANIEL V. O'LEARY, JR., M. D.	EDMOND J. O'DONNELL, M. D.

CALENDAR

1911

Regular winter session begins.....Tuesday, September 19
 Election vacation.....Monday and Tuesday, November 6 and 7
 Thanksgiving vacation begins Wednesday at 1 P. M., November 29
 Lectures resumed.....Monday morning, December 4
 Christmas vacation begins.....Saturday morning, December 23

1912

Lectures resumed.....Wednesday morning, January 3
 Lincoln's birthday, lectures suspended.....Monday, February 12
 Washington's birthday, lectures suspended, Thursday, February 22
 Commencement.....Tuesday, May 14

REQUIREMENTS FOR ADMISSION

All matriculates must secure 60 academic counts or their full equivalent, before beginning the first annual course counted toward the degree.

When all requirements are fulfilled, the regents issue a medical student certificate which the candidate must file with the registrar of the college.

Preliminary Examination. The preliminary examination of medical students is under the control of the Board of Regents of the University of the State of New York. Those contemplating the study of medicine should apply to the Examinations Division, University of the State of New York, Albany, by letter or otherwise, if information concerning this examination further than that given in the catalogue of the Medical College is desired. One of the examinations will be held in Albany, January 15-19, 1912.

Mid-Winter Written Examinations in all the departments are held before the Christmas vacation. A printed schedule of these examinations is furnished the class.

COURSE OF INSTRUCTION

The four-year graded course required of all candidates for the degree of Doctor of Medicine embraces the following subjects:

First Year

1. **Anatomy.** Three lectures; six hours osteology and dissection.
 2. **Inorganic Chemistry.** Two and a half lectures; four hours laboratory; one recitation.
 3. **Organic Chemistry.** Two lectures; one recitation.
 4. **Physiology.** Two lectures; one recitation; two and a half hours laboratory and demonstration.
 5. **Histology.** Five hours laboratory; one recitation.
 6. **Materia Medica.** Three lectures; two recitations.
- Lectures 12½; laboratory 9 hours; dissection and demonstration 8½ hours; recitations 6 per week.

Second Year

1. **Anatomy.** Two lectures; seven hours dissection and demonstration; two recitations.
2. **Anatomy and Pathology of Nervous System.** One lecture; two and a half hours laboratory.
3. **Organic and Physiological Chemistry and Toxicology.** One and a half lectures; three hours laboratory; one recitation.
4. **Physiology.** One lecture; two and a half hours laboratory; one and a half recitations.

5. **Therapeutics.** One lecture; one-half recitation.
 6. **Theory and Practice.** Two lectures; one-half recitation.
 7. **Surgery (including Pathology).** Two hours laboratory; two lectures.
 8. **Bacteriology and Pathology.** Seven hours laboratory.
 9. **Physical Diagnosis.** One demonstration half the term.
 10. **Pharmacology.** One demonstration half the term.
- Lectures $10\frac{1}{2}$; dissections and demonstrations 8 hours; laboratory 17 hours; recitations $5\frac{1}{2}$ per week.

Third Year

1. **Theory and Practice.** Four lectures; two recitations; one hour clinics.
 2. **Clinical Microscopy.** Two and a half hours laboratory.
 3. **Therapeutics.** Two lectures; one recitation.
 4. **Electro-therapeutics.** One lecture half the term.
 5. **Obstetrics and Gynecology.** Three lectures.
 6. **Pediatrics.** One lecture; one recitation half the term.
 7. **Neurology.** One lecture; one recitation; one clinic.
 8. **Surgery (including operative, fractures, dislocations).** Five lectures; two recitations; three hours clinics.
 9. **Physical Diagnosis and Ophthalmology.** Section work two hours.
 10. **Medical Jurisprudence.** One lecture half the term.
 11. **Hygiene.** One lecture.
 12. **X Rays.** One demonstration half the term.
 13. **Obstetrical Histology and Pathology.** Two and a half hours laboratory.
 14. **History of Medicine.** One lecture half the term.
- Lectures $18\frac{1}{2}$; laboratory 5 hours; demonstration $\frac{1}{2}$ hour; recitations 6; section work 2; clinics 5 per week.

Fourth Year

1. **Theory and Practice.** Three lectures; one recitation; two and a half hours clinics.
2. **Neurology.** One lecture; one clinic.
3. **Gynecology.** One lecture half the term.
4. **Obstetrics.** Two and a half lectures.

5. **Surgery (including Orthopedics).** Four lectures; one recitation; three hours clinics.

6. **Specialties.** One recitation.

7. **Conferences.** One medical; one surgical.

8. **Clinical section work.** Sixteen hours.

Lectures 11; recitations 3; conferences 2; clinics $6\frac{1}{2}$; clinical section work 14 hours per week.

The order of instruction for the ensuing session will be found in the catalogue of the Medical College, and may be obtained by application to the registrar.

Laboratories

Practical Chemistry. The chemical laboratory is well furnished, conveniently arranged and supplied with all necessary apparatus. The laboratory course is preceded, since although some knowledge of chemistry is highly desirable none is now required at entrance, by a series of lessons upon chemical nomenclature, notation and the essential principles of theoretical chemistry, including the laws of combination and valence, and these subjects are therefore more briefly treated in the regular lecture course. The practical laboratory work includes tests for those metals and acids, which, in combination, are important as constituents of medicinal compounds or as poisons, together with the separation of the chief groups, volumetric analysis, the examination of unknown substances and toxicology. All chemical reactions are written upon the blackboards, discussed by the class, and entered upon their notes.

Experimental Physiology and Physiological Chemistry

The object of the course in practical physiology is to have the student formulate for himself ideas with regard to the normal working of the animal body. The laboratory work is introduced by an elementary consideration of the cell and its functions, ciliary motions, etc. This is followed by a detailed study of the phenomenon of contraction. The remainder of the first year is then devoted to a very careful consideration of the physiology of

digestion and nutrition. Among other things the physiological functions of the salivary, gastric, pancreatic and liver secretions are demonstrated and studied by means of artificial fistulae. The course is continued during the second year with a careful study of the circulation, respiration, and the physiology of the nervous system. Finally the attention of the class is directed to the physiological action of many of the more important drugs.

After the Christmas vacation the study of physiological chemistry is begun. Laboratory work in this subject consists in the isolation, preparation and identification by tests, of the various important proteins, fats and carbohydrates. The composition of the tissues and organs is next studied with special reference to their most important constituents; the chemistry of digestion, secretion and excretion then receives attention in relation to the several physiological processes involved. Finally there follows a thorough course in qualitative and quantitative urinalysis. The student is provided with a syllabus of the lectures and laboratory work and required to keep systematic notes of all lectures and experiments actually performed. The practical work is interspersed with lectures and recitations.

Anatomy

The dissecting, recitation and demonstration rooms are well lighted and equipped and an ample supply of carefully prepared material is available. An endeavor is made to make the entire course in anatomy practical, consistent and useful, and to assist the student in laying a broad foundation of anatomical knowledge on which to build future courses in didactic and clinical medicine and surgery.

Histology, Embryology, Pathology, Bacteriology and Clinical Microscopy

Work in these departments is carried on in the Bender Hygienic Laboratory, on Lake Avenue, near the Albany Hospital.

This building was erected by the late Matthew W. Bender of Albany, and is thoroughly equipped with the apparatus necessary for the study of histology, pathology, bacteriology and clinical

microscopy. Practical work in these branches is obligatory upon all students, and abundant opportunity is furnished in the laboratory for acquiring a thorough knowledge of these important subjects. An electric lantern which is adapted to the projection of pictures and microscopic preparations as well as lantern slides is used to supplement the more practical methods of demonstration.

Histology. The work consists of explanatory talks covering the subject of the day's study, followed by practical exercises in the laboratory.

Embryology. The star-fish egg is studied for early segmentation stages; gross and microscopic examination of a series of hen's eggs for formation of germ layers and development of the nervous and vascular systems. In a similar way the embryo of the pig is used for the development of the organs which is taken up again, according to the plan of Lewis, when each organ is studied histologically.

Bacteriology. The work consists of lectures followed by practical laboratory exercises. It is intended to render the student familiar with the underlying principles of bacteriology and their application to clinical medicine and surgery.

Pathology. The work consists of a short lecture on the subject under discussion for the day followed by practical exercises in pathological anatomy and histology. Besides this the students are instructed in the technique of making autopsies, and examine material from autopsies and surgical operations. Demonstrations in experimental pathology are introduced whenever possible.

Clinical Microscopy. The course consists of preliminary talks followed by practical work in the examination of blood, urine, sputum, fæces, stomach contents, exudates, etc.; and includes a short course in clinical bacteriology.

In all these courses the student is taught independent methods of work and is required to keep a permanent record, illustrated by drawings, of all laboratory exercises.

A limited number of students who have shown proper aptitude are offered the opportunity to work along more advanced lines.

For the alumni of this school, and for physicians in the vicinity,

this laboratory offers excellent facilities for the examination of urine, sputum, pathological specimens and blood. Information regarding such examinations may be obtained by communicating with Dr. Thomas Ordway, Director, Bender Laboratory, South Lake Avenue, Albany.

Practical Clinical Courses

In order to familiarize students with the practical work of their profession, and to bring them into closer personal contact with patients, the fourth year class is divided into sections of eight or ten men, and on four days in each week each man devotes several hours to the examination and personal observation, under the supervision of the instructors, of patients in the wards and out-patient departments of the various hospitals and dispensaries. In this clinical work special attention is devoted to the complete examination of the blood, urine, sputum and stomach contents, as well as to the special examination of the eye, ear and other organs. Thus in the course of the school year the men in each section acquire practical knowledge and technical diagnostic dexterity in general medicine, general surgery, dermatology, neurology, insanity, otology, laryngology, ophthalmology, rhinology, diseases of children and infants, infant feeding, diseases of the rectum and genito-urinary tract, operative surgery, orthopedic surgery, operative obstetrics, electro-therapeutics and medical technic.

FEES AND EXPENSES

Fees, excepting the final examination fee, are payable each year in advance, are not returnable, and are as follows:

First Year

Matriculation	\$5 00
Lecture Course	100 00
Chemical Laboratory	10 00
Histological Laboratory	10 00
Dissection (including material)	5 00
	\$130 00

Second Year

Matriculation	\$5 00	
Lecture Course	100 00	
Dissection (including material)	10 00	
Bacteriological and Pathological Laboratory..	15 00	
Physiological Chemistry and Experimental		
Pathology	15 00	
		\$145 00

Third Year

Matriculation	\$5 00	
Lecture Course	100 00	
Clinical Microscopy, Surgical and Obstetrical		
Pathology	15 00	
		\$120 00

Fourth Year

Matriculation	\$5 00	
Lecture Course	100 00	
Final examination	25 00	
		\$130 00

In addition to the fees above stated, an annual charge of two dollars is made to members of the first, second and third year classes taking laboratory courses at the Bender Laboratory, for the use of microscopes and other apparatus. This fee is paid to the director at the laboratory, and after laboratory tickets have been issued by the registrar. For the laboratory work in physiological chemistry there is a fee of two dollars to cover use of apparatus and breakage payable to the director at the beginning of the session. There is also a fee of five dollars paid by members of the fourth year class to the Guild for the Care of the Sick for the course in practical obstetrics.

All fees are payable strictly in advance except that the final examination fee may be paid at any time before the examinations begin. Graduates of the school may attend lectures and stated clinics without charge except for matriculation in case of prolonged attendance.

The cost of living in Albany is less than in most other cities of its size. The janitor of the college keeps a list of boarding houses at which good rooms and board can be obtained at from

four to five dollars a week or upwards, and by clubbing together students can live comfortably at still lower rates. No estimate can well be made of cost of text-books and other personal expenses since those of necessity vary greatly in different cases.

REQUIREMENTS FOR GRADUATION

The candidate must be twenty-one years of age, and exhibit a certificate from a physician or surgeon, duly authorized by law to practice his profession, that he has studied medicine and surgery under his instruction during the period required by law in this state, and he must present evidence of having complied with the law concerning preliminary examination.

He must have attended not less than four regular courses of lectures, of which the last shall have been at this college.

Students who have attended one or more courses of lectures at other recognized medical colleges may be admitted to advanced standing in this college if they submit proper evidence of such attendance and a precise statement of subjects included in "Examination Departments," as given in the Medical College Catalogue, in which satisfactory final examinations have been passed, and comply with the requirements stated under "Examination Rules." No credit will be given for work done elsewhere in the fourth year departments.

He must be of good moral character.

He must maintain a satisfactory standing during his course and pass a satisfactory final examination in the several branches taught.

Regular and punctual attendance is required, and matriculation tickets are endorsed with attendance at the end of the term.

For catalogues or further information, address

WILLIS G. TUCKER, M. D., *Registrar*,
Albany, New York.

ALBANY LAW SCHOOL

This school is among the oldest institutions of the kind in the country, having been established in 1851, and its graduates number many of the most successful men in the profession. The school is and has been largely represented in the executive, judicial and legislative departments of this and many other states, as well as of the federal government.

It became a part of Union University in 1873, and begins its sixty-second year as a law school with the present scholastic year. During its long and successful career it has, in common with other law schools, done much to demonstrate what was at one time doubtful, but is now accepted almost as an axiom, that a course at the law school is a well-nigh necessary prerequisite to a successful professional career. Its instructors have always been men of repute and standing, both for professional learning and personal character.

The local advantages of the city of Albany, as the seat of a professional school, can not be overrated. It is the capital of one of the leading states in the Union, whose legislature is in session here for the third part of the year, presenting opportunities not afforded by any other law school in the state for observing the methods and procedure collectively of the executive, judicial and legislative departments of the state government. The knowledge thus obtained by the students at law, who are to complete their course and to enter the realm of public affairs, can not be overestimated.

It is easily accessible, remarkably healthful, and the scene of great business and professional activity. It is large enough to afford its inhabitants all the means of culture and recreation naturally to be looked for in a city, while it is not so large as to make the cost of living burdensome, even to persons of extremely limited means.

The facilities afforded the students for reading and study are unsurpassed.

Besides the convenient and well chosen library of the school accessible to the students at all hours of the day and evening, the students have the privilege of using the state law library, the most extensive and best selected in the United States, consisting of 65,000 volumes or more.

With free access to these libraries the student may be relieved to a great extent from purchasing text-books.

TRUSTEES**President**

AMASA J. PARKER

Vice-President

SEYMOUR VAN SANTVOORD

Secretary

CHARLES J. BUCHANAN

MARCUS T. HUN	CHARLES C. LESTER
J. NEWTON FIERO	A. PAGE SMITH
DANFORTH E. AINSWORTH	IRVING G. VANN
D. CADY HERRICK	THOMAS H. HUBBARD
JAMES F. TRACEY	FREDERICK W. CAMERON
ALTON B. PARKER	CHARLES A. RICHMOND

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor of the University

J. NEWTON FIERO, LL. D., Dean
Professor of the Law of Procedure, Equity, Torts, Evidence

LEWIS R. PARKER
Professor of the Law of Bailments, Bills and Notes, Guaranty
and Suretyship, and Constitutional Law

FLETCHER W. BATTERSHALL
Professor of Elementary Law, Domestic Relations

FRANK WHITE
Professor of the Law of Corporations

GEORGE LAWYER
Professor of the Law of Contracts, Personal Property and Sales,
Bankruptcy

FRANK B. GILBERT

Professor of the Law of Real Property, Legislation, and
Statutory Construction

JACOB C. E. SCOTT

Professor of Criminal Law.

FREDERICK W. CAMERON

Professor of the Law of Patents, Copyright, and Trade-Marks

CHARLES J. HERRICK

Professor of Civil Law, International Law, and Conflict of Laws

HON. ALTON B. PARKER, LL. D.

Lecturer on Development of the Law

HON. IRVING G. VANN, LL. D.

Lecturer on Insurance

HON. WILLIAM E. WERNER

Lecturer on Constitutional Law

HON. ALDEN CHESTER

Lecturer on the Federal Judicial System

FREDERICK D. COLSON

Lecturer on Books and Their Uses

Hubbard Chair of Legal Ethics. The circular of seventy of the leading law schools of the country show that only twenty of this number make the subject of legal ethics part of the curriculum. With two exceptions, those schools are either in the west or south. These facts led Gen. Thos. H. Hubbard, class of '60, to place at the disposal of the board of trustees the sum of \$10,000, the income to be applied to lectures upon this subject. The board of trustees decided to inaugurate the course at the opening of the school year of 1903.

CALENDAR

1911

Registration, first semester.....Tuesday, September 19
Scholastic year begins.....Wednesday, September 20
Election day recess.....Tuesday, November 7
Thanksgiving recess begins, noon.....Wednesday, November 22

Lectures resumed Tuesday, November 28
 Holiday recess begins, noon.....Thursday, December 21

1912

Lectures resumed Wednesday, January 3
 McKinley day Monday, January 29
 Examinations.....Thursday-Friday, February 1-2
 Registration, second semester.....Tuesday, February 6
 Washington's birthday, recess.....Thursday, February 22
 Good Friday, recess.....Friday, April 5
 Decoration day, recess.....Thursday, May 30
 Examinations.....Wednesday, Friday, May 29, 31
 Commencement.....Thursday, June 6

REQUIREMENTS FOR ADMISSION AND GRADUATION

The course for graduation is now three years. Candidates for graduation from this school will be required (1) to present evidence of a general preliminary education representing at least four years, or their equivalent, of work of a grade above the elementary or grammar school before beginning the course of study; (2) to have studied law at least three full years for the degree of LL. B., each school year of which shall consist of not less than thirty-two school weeks, exclusive of vacations, in which not less than ten hours of attendance upon law lectures or recitations of such prescribed course to be given or conducted by regular members of the faculty are required in each week, unless admitted to advanced standing of one year on graduation from a registered college or university; (3) to complete the course in residence of not less than one year; (4) to be of good moral character; (5) to be at least twenty-one years of age.

EXPENSES

Matriculation fee, on entrance.....	\$10
Tuition, each year.....	110
Graduation fee	10

For catalogues or further information address

JNO. J. HUGHES, *Registrar*

Albany Law School,

Albany, N. Y.

THE DUDLEY OBSERVATORY

The Dudley Observatory is located on Lake avenue, in the southwestern part of Albany, to which site it was removed in 1893 from its former location in the northern part of Albany. It is devoted to original researches in astronomy, according to the purpose of its founder and successive patrons. Its contributions to science are represented in two volumes of "Annals" and in other published volumes and memoirs contained in the transactions of learned societies and astronomical journals. Its principal line of work at the present time is the determination of problems relating to the positions and motions of the stars and of the solar system as a whole. The staff consists of the director, eight assistants and seven computers.

The instrumental equipment of the observatory is designed for the purposes of exact measurement in line with its chosen work. In the tower of the main building is the Pruyn equatorial, with object-glass twelve inches in diameter. This instrument is equipped both for visual and photographic use, and is of a high order of mechanical perfection. The Olcott meridian circle is located in a separate building, especially designed for securing the utmost equality in the temperature between the external air and that in the building itself. Its object-glass is eight inches in diameter. It was made by Pistor and Martins, of Berlin, and is regarded by astronomers as a masterpiece of accurate workmanship. This instrument has been employed for many years in obtaining the measurements necessary for the construction of the numerous and elaborate star catalogues which have issued from the Dudley Observatory.

In addition to these instruments, the observatory is in possession of various small telescopes, clocks, chronographs and smaller apparatus.

The institution is supported by an endowment, chiefly contributed by Mrs. Blandina Dudley, the late Catharine W. Bruce, and Hon. Frederic P. Olcott, as well as by appropriations which have been received from the National Academy of Sciences, and from current contributions of trustees and friends of the institution.

Since 1902, annual grants have been made to the director of the observatory by the Carnegie Institution of Washington. These have been sufficient to provide for the entire force of assistants and computers now employed. In 1905, the Carnegie

Institution made special provision for carrying on the star researches upon which the observatory is engaged for a period of ten years. This includes an appropriation which enabled the observatory to send the Olcott meridian circle to the southern hemisphere for two years with an ample force of observers, in order to carry out an essential feature of its investigations.

The Dudley Observatory is not designed to give general instruction in astronomy, though special students contemplating instruction in professional lines have been received from time to time under an arrangement of computing service to the observatory.

The observatory is opened to visitors on Tuesday evening of each week from 8 to 10 o'clock.

For further particulars apply to

LEWIS BOSS, Director

TRUSTEES

President

SAMUEL B. WARD, M. D., PH. D.

Vice-President

WILLIAM H SAGE

Treasurer

DUDLEY OLCOTT

Secretary

LEWIS BOSS, A. M., LL. D.

CLARENCE RATHBONE

JAMES F. COOPER

GRANGE SARD

OSCAR L. HASCY

J. TOWNSEND LANSING

WILLIAM G. RICE

HENRY HUN

ROBERT C. PRUYN

GEORGE G. DAVIDSON

CHARLES A. RICHMOND

BENJAMIN W. ARNOLD

ANDREW S. DRAPER

STAFF

Director

LEWIS BOSS, A. M., LL. D.

Secretary

BENJAMIN BOSS, A. B.

Assistants

ARTHUR J. ROY, C. E., A. M. WILLIAM B. VARNUM, A. B.

HARRY RAYMOND, A. B. MEADE L. ZIMMER, A. B.

LEROY JENKINS, A. B. WILLIAM HUNT

LEROY Z. MEARNS, C. E.

ALBANY COLLEGE OF PHARMACY

The Albany College of Pharmacy was created by act of the board of governors of Union University, June 21, 1881, and constitutes the department of pharmacy of Union University. It was incorporated as the Albany College of Pharmacy, August 27, 1881. The college is centrally located at 43-45 Eagle street.

TRUSTEES

President

CHARLES NEWMAN

Vice-President

CHARLES GIBSON

Treasurer

JOHN M. BIGELOW

Secretary

THEODORE J. BRADLEY

ExOfficio

WILLIS G. TUCKER

SAMUEL B. WARD

ARTHUR L. ANDREWS

EDWARD N. McKINNEY

OTTO SCHOLZ

CHARLES A. RICHMOND

GUSTAVUS MICHAELIS

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Chancellor of the University

WILLIS GAYLORD TUCKER, M. D., PH. D.

Dean

Professor of Chemistry and Toxicology

ALFRED BIRCH HUESTED, M. D., PH. G.
Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.
Emeritus Professor of Pharmacy

THEODORE JAMES BRADLEY, B. S., PH. G.,
Secretary
Adjunct Professor of Inorganic Chemistry and Mathematics

GARRET VANDER VEER DILLENBACK, PH. G.
Associate Professor of Pharmacy

EDWIN CUNNINGHAM HUTMAN, PH. G.
Director of Pharmaceutical Laboratory

WILLIAM ATWOOD LARKIN, PH. G.
Instructor in Physics and Chemistry

SPENCER LYMAN DAWES, M. D.
Director of Microscopical Laboratory

JARED WATERBURY SCUDDER, A. M.
Instructor in Latin

WILLIAM LANSING BRADT, PH. G.
Lecturer on Pharmaceutical Jurisprudence

WILLIAM WALKER GIBSON
Instructor in Commercial Pharmacy

CALENDAR FOR 1911-1912

1911

Opening exercises.....Monday, October 2
Christmas recess begins.....Monday, December 25

1912

Lectures resumed Monday, January 8
Commencement.....Tuesday, April 23

REQUIREMENTS FOR ADMISSION

All applicants for admission to regular standing in this college must be at least seventeen years of age, and will be required to present a Pharmacy Student Certificate issued by the New York

State Education Department. The requirement for this certificate is the completion of the first year's course in a recognized high school or academy, or evidence of an equivalent education. Inquiries concerning this preliminary requirement may be addressed to the New York State Education Department, Albany, New York.

THE CURRICULUM

The curriculum of the college embraces:

Chemistry—Theoretical, general, pharmaceutical and analytical

Botany—Structural, systematic and analytical

Materia Medica and Pharmacognosy

Pharmacy—Theoretical and Practical

Microscopy—Theoretical and practical in its relation to pharmacy

Toxicology

Pharmaceutical Mathematics

Physics

Physiology

Latin

Pharmaceutical Jurisprudence

Commercial Pharmacy

GRADUATION

The diploma of this college confers the degree of Graduate in Pharmacy (Ph. G.). Applicants for this degree must have had the required preliminary education, be of good moral character, have attended two full courses in this college, or the last course in this college and the first in some other registered college of pharmacy; have passed satisfactory examinations and paid all fees as hereafter stated.

FEES FOR TUITION

EACH YEAR

Matriculation	\$5 00
Tuition	75 00

SITUATIONS

Students desirous of obtaining employment while attending college will be assisted as far as possible in securing situations, but employment cannot be promised in advance, and places cannot be secured by correspondence. During the past several years the faculty has had a much larger number of openings offered for graduates to lucrative positions than it has been able to fill. The demand on the part of the employers for skilled assistants is steadily increasing, and a college diploma or license from an examining board is demanded by law of those who engage in the practice of pharmacy in most of the states and cities of the Union.

For separate catalogue giving more complete information address

THEODORE J. BRADLEY, PH. G., *Secretary*
43-45 Eagle street
Albany, N. Y.

ENROLLMENT, UNION UNIVERSITY, 1911-12

STUDENTS OF UNION COLLEGE

Abbreviations

c, A. B. course; *ls*, Ph. B. course; *s*, B. S. course; *e*, B. E. course in general engineering; *se*, B. E. course in sanitary engineering; *ee*, B. E. course in electrical engineering; N. S., North Section; M. S., Middle Section; S. S., South Section; N. C., North College; S. C., South College.

An asterisk (*) before a student's name indicates that he has not been advanced in standing with his class.

Candidates for the Degree of Master of Arts

James Alexander Barkley.....	<i>Lake George</i>
Michael William Bray, A. B.....	<i>Churubusco</i>
Samuel M. Cavert, A. B.....	<i>Ballston Spa</i>
George M. Elmendorf, Ph. B.....	<i>Herkimer</i>
Paul J. Hagar, A. B.....	<i>Tarrytown</i>
Neilson C. Hannay, A. B.	<i>Troy</i>
Willis T. Hanson, Jr., A. B.....	<i>Schenectady</i>
Samuel B. Howe, A. B.....	<i>Plainfield, N. J.</i>
Arthur L. Maxon, A. B.....	<i>Corning</i>
Roy H. McCormack, A. B.....	<i>Madison, N. J.</i>
Floyd Leslie Miller, Ph. B.....	<i>Schenectady</i>
Lewis Stewart Parsons, A. B.....	<i>Soo Nipi Park, N. H.</i>
Ross Williams Tiffany, B. S.....	<i>Newburgh</i>
Charles N. Waldron, B. S.....	<i>Schenectady</i>
Mark S. Watson, A. B.....	<i>Chicago, Ill.</i>
James Bell Welles, A. B.....	<i>Elmira</i>

Candidate for the Degree of Master of Science

Sidney J. Lochner, A. M.....	<i>Bethlehem, Pa.</i>
------------------------------	-----------------------

Candidates for the Degree of Master of Civil Engineering

Harold W. Baker, B. E.....*Oneida*
 Harry C. Hoyt, B. E.....*Salt Lake City, Utah*

Graduate Students

James H. Cunningham, M. E. E., *Schenectady*, 333 Glenwood Blvd.
 Candidate for the degree of Doctor of Philosophy
 Cassius M. Davis, M. E. E.*Schenectady*, 32 Wendell Ave.
 Candidate for the degree of Doctor of Philosophy
 Olin J. Ferguson, M. E. E....*Schenectady*, 244 Parkwood Blvd.
 Candidate for the degree of Doctor of Philosophy
 Wilbert A. Garrison, A. M....*Schenectady*, 99 Van Vranken Ave.
 Candidate for the degree of Doctor of Philosophy
 Morland King, M. E. E.....*Schenectady*, Union College
 Candidate for the degree of Doctor of Philosophy
 Frank William Peek, Jr., M. E. E..*Schenectady*, N. Wendell Ave.
 Candidate for the degree of Doctor of Philosophy
 R. Philip Clark, B. E.....*Schenectady*, Phi Gamma Delta House
 Candidate for the degree of Master of Electrical Engineering

Seniors, Class of 1912

e Garfield V. R. Arthur.....*Keeseville*..... S. C. S. C.
c James Alexander Barkley.....*Lake George*.....545 Rugby Road
ee William Maser Beck.....*Kenmore*.....Δ T House
ee Leon Leroy Biche.....*Black River*.....Pyramid Club
e Arthur Doran Brown.....*Ogdensburg*.....A Δ Φ House
c Blaine Raymond Butler.....*Johnstown*.....Δ Φ House
ee Ralph de Pomerait Clarke.....*Schenectady*.....Σ Φ Place
e Howard Elisha Cook.....*Franklin*..... Pyramid Club
ee Harry Francis Coward.....*Buffalo*.....A Δ Φ House
s William Wallis Coykendall.....*Elmira*.....Ψ T House
ee Robert Earle Dennis.....*Kalamazoo*.....A Δ Φ House
e Earl Devendorf*Schenectady*.....1228 State St.
e Walter Stratton Easterly.....*Gloversville*.....Δ Φ House
s Thomas S. A. Fairbairn.....*Buffalo*.....A Δ Φ House

ee	Paul Fasoli	Glens Falls.....	Pyramid Club
e	James Harry Griffin.....	Fort Edward.....	Φ Γ Δ House
e	William Andrews Hardenbergh..	White Sulphur Spa. ..	Δ Τ House
ee	Franklin Earl Hardy.....	Canterbury, N. H., 105 Barrett St.	
c	Edward Francis Hennelly.....	Johnstown.....	N. S. N. C.
s	Charles Louis Hequembourg....	West Albany.....	Ψ Τ House
ee	Tsuyoshi Hirayama	Japan.....	35 Wendell Ave.
ee	Walter Sinn Hoyt.....	Monterey, Mass.....	A Δ Φ House
s	Floyd Clinton Kelley.....	Walton.....	Pyramid Club
ee	Montgomery Ker	Jersey City.....	N. S. N. C.
s	Myron Edward Krueger.....	Schenectady.....	R. F. D. No. 2
*s	Edward Potter Lawsing.....	Schenectady....	7 Glenwood Blvd.
s	Alexander Hamilton Leamon....	Schenectady.....	836 Union St.
*e	Robert Henry Lowrie.....	De Land, Fla.....	Pyramid Club
s	Edward Lawrence Mack.....	Vergennes, Vt.....	Φ Δ Θ House
s	Wallace Harmon Macmillan....	Schenectady....	209 Seward Place
ls	Allan Bernard Mann.....	Schenectady....	37 Glenwood Blvd.
ls	Arthur Daniel Mann.....	Schenectady....	37 Glenwood Blvd.
ee	Walter John Mann.....	New York City.....	Δ Τ House
s	Robert Paunee Marsh.....	Binghamton.....	130 Park Ave.
s	Edward Leo McDermott.....	Schenectady.....	129 Park Place
s	Fred Francis McGauley.....	Schenectady....	812 Hamilton St.
*e	Paul Carney McQuaid.....	Webster, Mass.....	B Θ Π House
s	John Mortimer Minuse.....	Port Chester.....	N. S. N. C.
*e	Harold Wheeler Morss.....	Albany.....	K Α Lodge
e	Amos Keller Munson.....	Herkimer.....	Φ Γ Δ House
s	Milton John Neubauer.....	Schenectady.....	834 State St.
e	Alden Jesse Palmer.....	South Bethlehem.....	Δ Φ House
e	Morris Palmer	Gloversville.....	Φ Δ Θ House
c	Robert Porter Patterson.....	Glens Falls.....	Φ Δ Θ House
ee	David B. Peckham.....	Bainbridge.....	Pyramid Club
s	Roy Webber Peters.....	Schenectady....	51 Washington Ave.
c	James Henry Potter.....	Amsterdam.....	X Ψ Lodge
e	William Allen Rice.....	Parksville.....	B Θ Π House
s	James Edwin Riley.....	Elmira.....	Ψ Τ House
*e	Alexander H. Robertson, Jr....	Brooklyn.....	Δ Τ House
s	Harry Rooseboom Sawyer.....	Cherry Valley.....	X Ψ Lodge
*c	Henry Austin Schermerhorn....	Schenectady.....	121 Park Place

<i>e</i>	Edgar Newton Scott.....	<i>Schenectady</i>	513 Summit Ave.
<i>se</i>	Frank Cady Sellnow.....	<i>Albany</i>	K A Lodge
<i>e</i>	Joseph Bernard Shaw.....	<i>Auburn</i>	Θ Λ Φ House
<i>c</i>	Raymond Dalton Shepard.....	<i>Hudson</i>	Δ Δ Φ House
<i>s</i>	Edgar J. Simmons.....	<i>Glens Falls</i>	K A Lodge
<i>*ee</i>	Fred Arthur Slade.....	<i>Buffalo</i>	K A Lodge
<i>s</i>	Daniel Glen Smith.....	<i>Schenectady</i>	53 Washington Ave.
<i>ls</i>	Ralph Louis Streever.....	<i>Schenectady</i>	7 Wanmer St.
<i>e</i>	Tulloch McC. Townsend.....	<i>Phelps</i>	Φ Γ Δ House
<i>s</i>	Alexander Winfield Trainor....	<i>West Leyden</i>	Pyramid Club
<i>*ee</i>	Horace Niles Trumbull.....	<i>Hartford, Conn.</i>	K A Lodge
<i>ee</i>	Martin Emanuel Untermeyer....	<i>New York City</i>	N. S. N. C.
<i>ee</i>	Jacob E. Van Aernam.....	<i>Altamont</i>	Φ Δ Θ House
<i>c</i>	Kenneth Eastwood Walser.....	<i>Cohoes</i>	Δ Δ Φ House
<i>ee</i>	Bayard Boyd Webb.....	<i>Fulton</i>	X Ψ Lodge
<i>c</i>	Chauncey Holmes Winters.....	<i>Richmondville</i>	226 Union St.
<i>*e</i>	Grover Allen Woodard.....	<i>Hadley</i>	Φ Γ Δ House
Seniors—69			

Juniors, Class of 1913

<i>ee</i>	Raymond Hilton Bond.....	<i>Washington, D. C.</i>	103 Nott Ter.
<i>*e</i>	Edwin Purdy Bouton, Jr.	<i>Trumansburg</i>	22 Park Place
<i>ee</i>	James Ransom Braman.....	<i>Port Chester</i>	Θ Λ Φ House
<i>ee</i>	Charles Francis Brate.....	<i>Albany</i>	N. S. N. C.
<i>ee</i>	Clarence Nicholls Bridge.....	<i>Charlevoix, Mich.</i> ...	Pyramid Club
<i>e</i>	Franklin H. H. Bryere.....	<i>Raquette Lake</i>	Pyramid Club
<i>e</i>	Charlie Heber Carlisle.....	<i>Spartanburg, S. C.</i>	135 Van Vranken Ave.
<i>*ee</i>	Frederick M. Champion	<i>Clinton</i>	Φ Δ Θ House
<i>ls</i>	Giles Davis Clark.....	<i>Albany</i>	572 Third St., Albany
<i>ee</i>	Kenneth P. Conover.....	<i>Amsterdam</i>	Pyramid Club
<i>e</i>	John C. Cronin.....	<i>Glens Falls</i>	Θ Λ Φ House
<i>s</i>	Henry Bryan Daly.....	<i>Hudson Falls</i>	Φ Γ Δ House
<i>s</i>	Harry Lee Davenport.....	<i>Scotia</i>	1 Mohawk Ave., Scotia
<i>ls</i>	Norman Alexander Davis.....	<i>Warren, Pa.</i>	Φ Γ Δ House
<i>s</i>	Hartley Greaves Dewey.....	<i>Schenectady</i>	B Θ Π House
<i>ls</i>	Harold H. Dickinson.....	<i>Buffalo</i>	Σ Φ Place
<i>*ee</i>	Neville S. Dickinson	<i>De Land, Fla.</i>	146 Brandywine Ave

c	Alexander Galt Duane.....	New York City.....	Σ Φ Place
c	David Roy Finley.....	Geneseo.....	Ψ T House
ee	Clarence Root Fischle.....	Buffalo.....	B Θ Π House
ee	John Henry Gardner, Jr.....	Meadowdale.....	X Ψ Lodge
s	De Forest Van Slyck Garnsey...	Schenectady.....	1829 Union St.
e	Paul Giddings	Corfu.....	Pyramid Club
ee	Ernest T. Gilbert.....	Binghamton.....	783 Nott St.
ee	Lansing J. Gilmore.....	Salem.....	Pyramid Club
s	Clarence Wilson Hall.....	Luzerne.....	Φ Δ Θ House
e	Richard Keese Hallock.....	Stamford....	220 Glenwood Blvd.
ls	Theodore William Hanigan....	Schenectady.....	938 State St.
c	Frederick Staley Harris.....	Peekskill.....	Δ Φ House
s	Don King Hutchens.....	Pulaski.....	A Δ Φ House
ee	Nugihalli Narasimha Iengar....	Bengalore, India...	26 Union Ave.
*s	Henry H. Kimberly.....	Watervliet.....	A Δ Φ House
e	Joseph Kirchenbaum	Schenectady.....	347 Maxon Road
s	Robert Francis La Barron.....	Binghamton.....	Δ T House
e	Richard Perkins Lent.....	Highland.....	Φ Δ Θ House
ee	William Johnson Lewis.....	Cohoes	K A Lodge
ee	Russell Edmund Lowe.....	New York City.....	A Δ Φ House
e	Charles Thomas Male.....	Niskayuna	Niskayuna
c	Hubert Mann	Schenectady...	37 Glenwood Blvd.
s	Thomas Marion Marshall.....	Yonkers.....	K A Lodge
ee	Charles F. Masterson.....	Barton.....	Ψ T House
ls	Stephen Lorenzo Mayham.....	Schoharie.....	Δ Φ House
e	Leland Rea McKnight.....	Salem	Pyramid Club
e	Joseph McMahon	Elmira.....	21 Park Place
e	George Stanley Meikle.....	Schenectady.....	Y. M. C. A.
c	Joseph Patrick Mohair.....	Newton, N. J.....	Pyramid Club
e	Harry Edward Mull.....	Oneonta.....	Δ T House
s	Robert Fortney Payne.....	Schenectady...	242 Parkwood Blvd.
ee	Carlos Pires Pontual.....	Sao Paulo, Brazil....	M. S. S. C.
ee	Philip Noyes Riedinger.....	Elmira	Ψ T House
ls	William Alexander Rogers.....	Yonkers.....	Σ Φ Place
ee	James M. Roshirt.....	Albany.....	Pyramid Club
ee	John Atwood Royce.....	Liberty.....	Δ T House
e	Isidor Schulman	Schenectady.....	36 Foster Ave.
*e	John Joseph Shea.....	Albany....	53 Westerlo St., Albany

<i>ls</i>	M. Sutphen Somers.....	<i>Johnstown</i>	Δ Φ House
<i>ee</i>	Konrad Stern	<i>Clinton</i>	Pyramid Club
<i>ee</i>	Hugh Montgomery Stoller.....	<i>Schenectady</i>	X Ψ Lodge
<i>se</i>	Walter von Dohlen Tiedeman...	<i>Schenectady</i>	511 Smith St.
<i>c</i>	Van Rensselaer Tremper.....	<i>Albany</i>	A Δ Φ House
<i>e</i>	Franklin Peter Ulrich.....	<i>Scotia</i>	Scotia
<i>ee</i>	Clyde Dirwain Utter.....	<i>Oneonta</i>	514 Union St.
<i>ee</i>	George Stewart Van Antwerp...	<i>Johnstown</i>	North Colonnade
<i>e</i>	Carl E. Vedder.....	<i>Schenectady</i>	223 Crane St.
<i>s</i>	Milton George Wend.....	<i>Albany</i>	Φ Γ Δ House
<i>ee</i>	Douglas Weare Whitney.....	<i>Chicago</i>	X Ψ Lodge
<i>s</i>	Roy Cameron Whitney.....	<i>Oswego</i>	Φ Γ Δ House
Juniors—67			

Sophomores, Class of 1914

<i>e</i>	C. Harry Anderson.....	<i>Olean</i>	Pyramid Club
<i>e</i>	David Percy Anderson.....	<i>Pocantico Hills</i>	B Θ Π House
<i>s</i>	Everett La Mott Baker.....	<i>Oneida</i>	Ψ Τ House
<i>e</i>	James Vincent Baker.....	<i>Port Chester</i>	N. S. N. C.
<i>e</i>	Carlton M. Baldwin.....	<i>Glens Falls</i>	Pyramid Club
<i>e</i>	Frank Dorn Barclay.....	<i>Schenectady</i>	B Θ Π House
<i>s</i>	Sidney William Bisgrove.....	<i>Schenectady</i>	1706 Union St.
<i>e</i>	George Sumner Bradford.....	<i>S. Gardner, Mass.</i> , 29	Chestnut St.
<i>*e</i>	John H. Burwell, Jr.....	<i>Saratoga</i>	Φ Γ Δ House
<i>e</i>	Louis Chester Case.....	<i>Guilderland</i>	Ψ Τ House
<i>s</i>	Riley Hamilton Coons.....	<i>Burnt Hills</i>	Ψ Τ House
<i>ls</i>	William Lawrence Coté.....	<i>Lake George</i>	616 Terrace Place
<i>e</i>	Leon Elisha Decker.....	<i>South Fallsburg</i>	Θ Δ Φ House
<i>e</i>	Sidney Ferdinand Dejonge.....	<i>Tompkinsville</i>	K A Lodge
<i>e</i>	Louis du Bois De La Vergne...	<i>Kingston</i>	A Δ Φ House
<i>e</i>	Eli Sarkis Eghiayan.....	<i>Beyreuth, Syria</i>	256 State St.
<i>e</i>	Cyrus Bruce Elmore.....	<i>Middletown</i>	B Θ Π House
<i>s</i>	Thomas Leland Ennis.....	<i>Rotterdam Junction</i> .	A Δ Φ House
<i>e</i>	Richard William Evans.....	<i>Fergus Falls, Minn.</i> ...	K A Lodge
<i>s</i>	Harry Clarkson Ewens.....	<i>Buffalo</i>	A Δ Φ House
<i>e</i>	Eugene D. Filmer.....	<i>Gloversville</i>	Pyramid Club
<i>e</i>	Myron J. Folensbee.....	<i>Schenectady</i>	Δ Τ House
<i>e</i>	Ernest Allen Fox.....	<i>Gloversville</i>	B Θ Π House

e	Herman Frank	Schenectady	831 Grant Ave.
e	J. Gordon Gidley	Johnstown	Δ Φ House
e	Harold Duane Godfrey	Rosebank, N. J.	K Δ Lodge
e	John Robert Pooley Goller	Freeport	N. S. N. C.
e	Harrison Gunning	Freeport	Ψ Υ House
c	Jerome D. Guthmann	Schenectady	5 Parkwood Blvd.
*s	George Streeter Hackney	Johnstown	Δ Φ House
e	Luther Alfred Hagar	Plattsburg	B Θ Π House
e	Albert Ives Hall	Saratoga Spa	Θ Δ Φ House
e	John Alden Hall	Washington, D. C.	103 Nott Ter.
s	Arthur Leopold Hawley	Schenectady	A Δ Φ House
c	Henry Herman Hitchcock	Cambridge	Δ Υ House
s	John Taylor Howell, Jr.	Newburgh	X Ψ Lodge
*e	John Dalton James	Albany	Δ Υ House
e	Frank Milton Jepson	Tippecanoe City, O.	1205 State St.
e	Harry Merrill Johnson	Hornell	Δ Υ House
s	Charles Albion Kenworthy	Amsterdam	Ψ Υ House
s	John Kruesi	Schenectady	Σ Φ Place
e	John Porter Lacey	Highland	Φ Δ Θ House
e	George Edward Lewis, Jr.	Marion	Φ Δ Θ House
e	John Vrooman Lewis	Hammondsport	108 Nott Terrace
e	Arthur Loeb	Schenectady	712 South Ave.
*ls	Victor Alexander Lord	Syracuse	248 Union St.
e	William George Lutz	Schenectady	914 Delmont Ave.
e	Walter Everett Maxwell	Schenectady	297 Broadway
e	Andrew Stanton McCormick	Boonville	Pyramid Club
s	Alfred Cluett Meneely	Watervliet	A Δ Φ House
e	Floyd Raymond Milroy	Scotia	211 James St., Scotia
*e	Argemiro de T. Piza e Moraes	Sao Paulo, Brazil	223 Seward Pl.
e	Ralph D. Morgan	Buffalo	Δ Υ House
s	William Alvin Mudge	Schenectady	233 Liberty St.
e	Harry Fross Naumann	Oneida	Ψ Υ House
s	Orla James Park	Hudson Falls	X Ψ Lodge
c	Ernest Passage	Duanesburg	244 McClellan St.
s	Dalton Vane Sarvey	Elmira	Ψ Υ House
s	Morris P. Schaffer	Schenectady	886 Emmett St.
e	Le Roy Sand Schell, Jr.	Schenectady	1103 State St.
c	John Sherburne, 2nd	Amsterdam	Φ Γ Δ House

s	Arthur David Sherman.....	Albany.....	S. S. S. C.
s	Charles Sherman	Albany.....	K A Lodge
*e	Edgar Charles Shoup.....	Jersey Shore, Pa. 487 Central Ave., Albany	
s	Carl Edwin Spaulding.....	Brooklyn.....	K A Lodge
e	Stephen Bond Story.....	Freeport.....	Ψ T House
e	William Royal Taylor.....	Albany.....	110 Nott Terrace
e	Archibald Scott Telfer.....	Hartwick.....	Φ Δ Θ House
e	Homer Michael Tinklepaugh....	Sodus	Φ Δ Θ House
c	George Octavius Truex.....	Bolton Landing	Θ Δ Φ House
e	Lansing Edwin Van Allen.....	Delmar. R. F. D. No. 1, W. Albany	
c	Raymond Van Santvoord.....	Cohoes.....	Ψ T House
e	Roblee Hamilton Vaughan.....	Saratoga Spa.....	Δ Φ House
s	Warren Chase Vosburgh.....	Voorheesville	Θ Δ Φ House
e	George Wadsworth	Buffalo.....	A Δ Φ House
e	J. Bernard Wallace.....	Schenectady....	353 McClellan St.
*e	John Michael Wallace.....	Schenectady....	353 McClellan St.
e	Stanley Lincoln Walworth.....	Owego.....	A Δ Φ House
e	James Robert West.....	Sodus.....	Φ Δ Θ House
s	Morgan L. Williams.....	Medway.....	841 Union St.

Sophomores—80

Freshmen, Class of 1915

c	Karl Engle Agan.....	Port Henry.....	Δ T House
e	Nicholas Francis Alex.....	Albany.....	Lancaster St., Albany
c	Harvey Floyd Bain.....	Argyle.....	723 Nott Street
s	Walter C. Baker.....	Oneida	Ψ T House
e	Wesley Hinson Baldy.....	Buffalo	Δ T House
s	James Truby Beattie.....	Elwood, Ill.....	X Ψ Lodge
s	David John Beaver.....	Schenectady.....	849 Albany St.
s	Jacob Julius Beaver.....	Schenectady.....	849 Albany St.
s	Raymond Stewart Blodgett.....	Jefferson.....	Pyramid Club
e	Albert Ralph Boomhower.....	Plattsburgh.....	172 Nott Terrace
e	Ralph Emmons Boyce.....	Nassau.....	514 Union St.
s	Stephen William Brennan.....	Clinton.....	731 Nott St.
e	Charles Valentine Brewster.....	Schenectady.....	R. F. D. No. 8
e	Harry Augustus Buckley.....	Plattsburgh.....	111 Nott Terrace
e	James Sheldon Butler.....	St. Johnsville.....	Δ T House

<i>ls</i>	Ambrose M. Clark.....	<i>Schenectady</i>	Σ Φ Place
<i>e</i>	Prescott Coyle Cleveland.....	<i>Jamaica</i>	Ψ Υ House
<i>e</i>	Rodrigo Monteiro Conceição....	<i>Sao Paulo, Brazil</i> ..	M. S. S. C.
<i>e</i>	Stephen Joseph Costello.....	<i>Schenectady</i>	706 South Ave.
<i>c</i>	Donald A. Coulter.....	<i>Schenectady</i>	24 Division St.
<i>c</i>	Leo Joseph Cunningham.....	<i>Glens Falls</i>	Θ Δ Φ House
<i>e</i>	Fred Dales Cure.....	<i>Pine Hill</i>	Δ Υ House
<i>ls</i>	Thomas Ashley Dent, Jr.....	<i>Pelham Manor</i>	A Δ Φ House
<i>s</i>	Archibald Hastie Dick, Jr.....	<i>Schenectady</i>	133 Park Ave.
<i>s</i>	Edward Rice Doyle.....	<i>Buffalo</i>	North Colonnade
<i>c</i>	Robert Livingston Duane.....	<i>New York City</i>	Σ Φ Place
<i>e</i>	Lennis W. Dunbar.....	<i>Gloversville</i>	Δ Φ House
<i>s</i>	Henry Louis Faust.....	<i>Schenectady</i>	A Δ Φ House
<i>e</i>	Pedro Ferraz Netto.....	<i>Sao Paulo, Brazil</i>	M. S. S. C.
<i>e</i>	William John Fisher.....	<i>Buffalo</i>	157 Lafayette St.
<i>e</i>	Samuel Henry Frankel.....	<i>Schenectady</i> ...	234½ So. Ferry St.
<i>ls</i>	Lewis Arms Gilbert.....	<i>Newark</i>	M. S. S. C.
<i>c</i>	James Henry Gould.....	<i>Scotia</i>	Scotia
<i>e</i>	Howard Dewey Green.....	<i>Liverpool</i>	Δ Υ House
<i>s</i>	Clarence Edwin Gregg.....	<i>Schenetady</i>	9 Lafayette St.
<i>s</i>	George Fulford Hanson.....	<i>Schenectady</i>	A Δ Φ House
<i>e</i>	George Harold Harp.....	<i>Oneonta</i>	514 Union St.
<i>e</i>	Frank Earle Harrison.....	<i>Schenectady</i>	120 Parkwood Blvd.
<i>s</i>	Paul Alfred Hauenstein.....	<i>Buffalo</i>	A Δ Φ House
<i>e</i>	Howard Snow Hawn.....	<i>Ravena</i>	Φ Δ Θ House
<i>ls</i>	Rufus Rosendale Hessberg.....	<i>Albany</i>	North Colonnade
<i>e</i>	Lynde De Forest Hokerk.....	<i>Richfield Springs</i>	Δ Υ House
<i>s</i>	John Aloysius Holland.....	<i>Schenectady</i>	7 Clifton Place
<i>s</i>	Ernest Baker Houghton.....	<i>Schenectady</i>	28 Swan St.
<i>e</i>	Horace Newton Hubbs.....	<i>Geneva</i>	A Δ Φ House
<i>e</i>	Edward Richard Hughes.....	<i>Schenectady</i> ...	25 Glenwood Blvd.
<i>e</i>	William Arthur Hughes.....	<i>Schenectady</i> ...	25 Glenwood Blvd.
<i>c</i>	Charles Hedrick Hummer, Jr...	<i>Ravena</i>	Scotia
<i>e</i>	Hazen Hunter	<i>Florida</i>	B Θ Π House
<i>e</i>	George Edward Huthsteiner....	<i>Schenectady</i>	X Ψ Lodge
<i>s</i>	Thomas Philip Keating, Jr.....	<i>Schenectady</i> ...	322 Germania Ave.
<i>s</i>	Isidor Krohn	<i>Utica</i>	324 Summit Ave.
<i>c</i>	Barlow Lingley Loomis.....	<i>Unadilla</i>	Pyramid Club

<i>ls</i>	Roger William Macmillan.....	<i>Schenectady</i> ..	145 Glenwood Blvd.
<i>s</i>	Robert A. MacTaggart.....	<i>Schenectady</i>	427 Smith St.
<i>s</i>	William Peter Madden.....	<i>Schenectady</i>	109 Division St.
<i>e</i>	Cornelius Mahaney	<i>Fort Plain</i>	1225 Union St.
<i>e</i>	William Hubert Mandeville.....	<i>Elmira</i>	Ψ Τ House
<i>c</i>	Austin Geddes Martin.....	<i>Alba, Pa.</i>	K A Lodge
<i>ls</i>	Edgar H. Martin.....	<i>Dallas, Texas</i>	Φ Γ Δ House
<i>e</i>	Harry Benjamin Marvin.....	<i>New York City</i>	Δ Τ House
<i>s</i>	Alfred Leo McGarry.....	<i>Cleveland, Ohio</i>	A Δ Φ House
<i>s</i>	Comerford McLoughlin	<i>Rye</i>	K A Lodge
<i>s</i>	William Cramer McMichael....	<i>Scotia</i>	Scotia
<i>c</i>	George Raymond Moore.....	<i>Scotia</i>	Scotia
<i>e</i>	Merton Moore	<i>Potsdam</i>	Δ Τ House
<i>e</i>	Edwin Asa Norton.....	<i>Derry, N. H.</i>	821 Strong St.
<i>e</i>	Russell Ainslee Orr.....	<i>Summit, N. J.</i>	2 Stratford Road
<i>e</i>	David Benson Page, Jr.....	<i>Oswego</i>	Σ Φ Place
<i>s</i>	Henry Z. Persons.....	<i>East Aurora</i>	A Δ Φ House
<i>e</i>	Clarence Eugene Peterson.....	<i>Schenectady</i>	220 Liberty St.
<i>e</i>	Charles Howard Purdy.....	<i>Downsville</i>	Φ Δ Θ House
<i>e</i>	Jay Curtis Purple.....	<i>Newark Valley</i>	Pyramid Club
<i>ls</i>	Frank Stanley Randles.....	<i>Argyle</i>	723 Nott St.
<i>s</i>	Thomas Charles Rankin, Jr....	<i>Troy</i>	Φ Γ Δ House
<i>e</i>	Earl Leroy Rice.....	<i>Scranton, Pa.</i>	X Ψ Lodge
<i>e</i>	Fernando Ferreira da Rosa....	<i>Sao Paulo, Brazil</i> ..	No. Colonnade
<i>e</i>	Orlando Ferreira da Rosa.....	<i>Sao Paulo, Brazil</i>	M. S. S. C.
<i>e</i>	Merrill Augustus Sauerbrei....	<i>Troy</i>	726 Eastern Ave.
<i>e</i>	John L. Scully.....	<i>Schenectady</i>	526 Liberty St.
<i>ls</i>	Earl J. Sharp.....	<i>Altamont</i>	906 Emmett St.
<i>e</i>	Paul Frederic Shontal.....	<i>New York City</i>	K A Lodge
<i>ls</i>	Frank Leander Smith.....	<i>Morrison, Ill.</i>	X Ψ Lodge
<i>s</i>	Stanley Maynard Smith.....	<i>Herkimer</i>	Ψ Τ House
<i>ls</i>	Donald Arthur Starbuck.....	<i>Gouverneur</i>	B Θ Π House
<i>s</i>	Thomas William A. Stewart....	<i>Argyle</i>	111 Nott Terrace
<i>e</i>	David George R. Stoetzel.....	<i>Schenectady</i>	407 Francis Ave.
<i>s</i>	Hubert Josiah Titus.....	<i>Schenectady</i>	1371 Union St.
<i>e</i>	John Edward Turgeon.....	<i>Clayton</i>	B Θ Π House
<i>e</i>	Gordon O. Vosburgh.....	<i>Johnstown</i>	605 Union St.
<i>e</i>	John Henry Vought, 2nd.....	<i>East Aurora</i>	Σ Φ Place

s Harold S. Vroman.....	Middleburgh	Δ Φ House
s William Winslow Wait.....	Schenectady.....	Α Δ Φ House
e Gerrit Van Wagensen Wood....	Geneva	Σ Φ Place
e Howard Lee Woods.....	Albion.....	Ψ Υ House
Freshmen—95		

Summary of Students, Union College

Candidates for the Master's Degree.....	19
Graduate Students	7
Seniors	69
Juniors	67
Sophomores	80
Freshmen	95
	337
Counted twice	I
Total.....	336

STUDENTS OF THE ALBANY MEDICAL COLLEGE

Fourth Year Class

Max Alonzo Almy	Corning
Horace Edward Auringer	Cohoes
Bertram Truman Baker	Warrensburg
Clifton Bogardus	Catskill
John Lawrence Both	Lawrence
Joseph Henry Bowers	Albany
John Joseph Cahill	Hudson Falls
Alton Brooks Daley	Coxsackie
Sol Charles Davidson	Rochester
John Lounsbery Edwards	Randall
George Augustine Green	Mechanicville
Paul Pattengill Gregory	Welcome
Walter Robert Grunewald	Gloversville
John Duncan Gulick	Cranbury, N. J.
Vasileos Michael Koundourianes, B. A.	Albany
Royal Estabrook La Grange	Glens Falls
Albert Lenz	Johnstown
Norman Howe Liberty	Ticonderoga
Charles Immanuel Loebke	Troy
William Edgar Low, Jr.	Catskill
Donald Angus MacDuffie	Olean
Domenico Carlantonio Mauro	Gloversville
Joseph Ambrose McPhillips	The Glen
Ward Winthrop Millias, Ph.B.	Valley Falls
James Henry Mitchell, Jr.	Cohoes
Floyd Hazard Moore	Herkimer
Clarence Edmond Mullens	Albany
Homer Hollett Oaksford	Gloversville
Daniel Francis O'Keeffe	Hadley
Daniel Tobias Read	Monck's Corner, S. C.
Michael Augustine Rogers	Schuylerville
William Henry Seward	Amsterdam
George Aaron Sharp	Westfield, Mass.
Arthur Henry Stein, B.S.	Albany
Charles Edward Stott	Albany

Sterling Wallace Todd	Hyde Park
William Trotter	Troy
Floyd Alberti Weed	Catskill
Arthur Hastings Wheeler	Troy
Ira Condict Whitehead, Jr.	Albany

Fourth Year Students—40.

Third Year Class

William Alfred Ackroyd, B.S.	East Schodack
Wesley Mason Adams ..	Davenport
Morris Bryan Beecroft	Schaghticoke
Orvis Adoniram Brenenstuhl.....	Petersburg
Darwin Alfred Bruce	Albany
John Leonard Byrnes	Schenectady
Garrett Marcellus Clowe	Schenectady
Walter Roy Liddell Coakley	Buffalo
Rufus Baker Crain	Richfield Springs
Nathaniel Crost	Saratoga Springs
Burke Diefendorf	Fort Plain
Jacob Drooz	Albany
Dwight Guilford Dudley	Maine
Hugh Vincent Foley	Watervliet
George Victor Genzmer ..	Pittsfield, Mass.
Elmer Ray Gladstone	Shavertown
Hugh Sewell Gregory	Horseheads
Raymond Hensel	Buffalo
Harry Smith Howard	Albany
Alson Joy Hull	Williamstown, Mass.
Eugene Fellner Hull	Berlin
Ray Holly Humphrey ..	Rensselaer
William James Jones	Amsterdam
Whitney Hotaling Joyce	Unadilla
William Herman Ladue	Beekmantown
Roy Ludlum Lippincott	Campbell Hall
John Wellington Mambert	Churchtown
Schuyler McCulloch Martin	Albany
Raymond Francis McAloon.....	Keeseville

Michael Edward Nolan	Eagle Bridge
Henry Bernard O'Keeffe	Luzerne
Elmer Harrison Ormsby.....	South Glens Falls
John Swart Parker	Oneonta
Robert Edward Plunkett	Troy
William Carl Rausch, Jr.	Albany
Conrad Aloysius Rissberger	Albany
Ernest Charles Shultz	Schenectady
Woodard Shaw	West Hebron
Walter Joseph Smith	Port Leyden
Axel Fridolf Swanson	Southampton, Mass.
John Daniel Tidaback	Bloomfield, N. J.
Harold Dwyer Tobin	Chateaugay
Guy Brownell Van Alstine	Canajoharie
John James Walsh, LI.B.	Waterloo
Frank John Williams	Utica
Leon Wolff	Brooklyn
Charles Wesley Woodall	Schenectady

Third Year Class—47.

Second Year Class

David Wiltsie Beard	Cobleskill
John Peter Byrnes	Pittsfield, Mass.
Edward James Callahan	Mechanicville
Daniel Francis Carmody	Albany
George Clay Carter	Albany
John Kenneth Crandall	Wappingers Falls
George Jacob Culver	Schenectady
Daniel Sylvester Cuning	Troy
Arthur Manning Curran	North Adams, Mass.
Frank Edgerton Deeds	Schenectady
Albion James Fitzgerald	Albany
Frank Furlong	Highland
John Warren Gard	Auburn
Clarence Gardinier	Schenectady
Parker Arthur Groff	Rome
Robert Wilhelm Helm	Saratoga Springs

John Thomas Hopkins Hogan.....	Troy
William Patrick Howard	Albany
Edwin Horton Huntington	Hopewell Junction
Harry Vincent Judge	Albany
Clarence Giles Kirby	Nassau
Wilbur Foster MacDonald	Schenectady
James Breese McCormick.....	Troy
John Stoddard McCormick	Albany
Thomas Hugh McGrail	Albany
Burton Carr Miller, B.S.	Albany
Floyd Guy Nellis	Boonville
Wilbur Sylvester Newell	Syracuse
Vincent John Thomas O'Neill	Highland Falls
Julius Joseph Padula	Albany
Harry Day Parkhurst	West Winfield
Charles Adelbert Perry	Rome
Robert Reid, Jr.	Schenectady
Harry Stephen Reynolds	Schenectady
Edward Louis Robbins	Syracuse
James Israel Schoonmaker	West Coxsackie
Frank Arthur Searle	Southampton, Mass.
Lewis Jeriah Smith	Westfield, Mass.
Theron Smith	Newburgh
Leo Ross Tighe	Cohoes
William Bernice Davidson Van Auken.....	Voorheesville
Gregori Osepovitch Volovic	Lowville
William Irving Walsh	Troy
John Waluk	Amsterdam
Willard Elmer Wheelock	Canajoharie
Cecil Charles Whittemore	Albany
Fred DeGrande Wilson	Downsville
Laurence Randolph Worrell	Greene
Harry Theodore Wygant	Watervliet

Second Year Students—49.

First Year Class

James MacFeeters Archibold	Cohoes
Percy Huntley Austin	Warrensburg

Walter Schneider Bennett	Hartford
Thomas McGrath Boennock	Albany
John Edward Burke	Schenectady
John Dennis Carroll	Troy
Hugh Smith Chidester	Saugerties
Samuel Colliss	New York
Arthur Hiram Congdon	Fort Plain
Frank Vernon Craig	Solvay
Albert Nelson Crouch	Troy
Stephen Horace Curtis	Troy
Gerald Edward Dailey	Gloversville
Frank Edward Dean, Jr.	So. Shaftsbury, Vt.
Frederick Graham Decker	Rensselaer
Irwin Van Olinda Decker	Troy
Edward Thomas Delehanty	Albany
Harry Depan	Indian Lake
Arthur Maultby Dickinson	Albany
William Francis Dooley	Hoosick Falls
Francis Thomas Duffy	Troy
Loyal Lindsey Dunlop	Stony Creek
James Manning Dunn	Schenectady
Lawrence James Early	Schenectady
Frederick George Eaton	Saratoga Springs
Arthur Joseph Edson	Oneonta
Eugene Aurelius Eicher, A. B.	Albany
Guy Fish	Indian Lake
James Walter Fitzgerald	Troy
Patrick Joseph Fitzgibbons	Amsterdam
Hector Joseph Gibeau	Cohoes
Edmund Joseph Gracken	Amsterdam
Stephen William Grainer, Jr.	Rensselaer
Joseph Arthur Gratton	Troy
Gabriel Emmett Greeley	Cohoes
Leon Willis Green	E. Springfield
William Lester Grogan	Rome
Ralph Marsh Hall	Rensselaer
Raoul Albert Herbert	Cohoes
Sarkis Kevork Heshishian, A. B.	Schenectady

John Edward Heslin	Saratoga Springs
Lloyd Louis Hollenbeck	Catskill
Stanley Morton King	Urlton
Harold Leir	Rochester
Milton Lester Lewis	Brooklyn
James Sarsfield Lyons	Albany
Earl Cunningham MacCordy	Amsterdam
Enrique Martinez	Ocampo Coah, Mex.
William Bernard McKeon	Troy
Arthur Milton McKersie	Glenfarrow, Ont., Can.
John Leo Mulcahy	Cohoes
Henry Frederick James Muller	Rensselaerville
Martin Alvin Murphy	Hoosick Falls
Harry Scott Mouthony	Indian Lake
William Francis Nealon	Hoosick Falls
James Madison Neary	Watervliet
Charles Luman Nichols	Philmont
John Joseph O'Connor	Albany
Jonathan Pearson, B. S.	Schenectady
Theodore Dorris Reed	Albany
George Stiles Reitter	Stepney Depot, Conn.
Homer Isaac Rexford	Watervliet
Albert Roberts	Cohoes
William Joseph Ryan	Newport
Frank Philip Schneider	Utica
Isador Samuel Siegel, Ph. G.	Yonkers
Benjamin Hermin Shapiro	Glens Falls
Ernest Raymond Shilling	East Chatham
Byron Gray Shults	Johnstown
Robert Cunningham Simpson, Jr.	Amsterdam
William Patrick Sweeney	Saratoga Springs
Harry Anthony Taylor	Hudson
John David Thomas	Pownal
Charles William Tomlinson	Lansingburg
Leonard Kip Van Dyck, A. B.	Philmont
Herbert Austin Vogel	Albany
Fred Vosburgh	Cobleskill
Archibald Albert Walker	Callicoon

John Joseph Wand	Johnstown
Henry Russel Washbon	Morris
Earl Charles Waterbury	Campbell Hall
Bernath Weiss	Brooklyn
First Year Class—82	

Summary of Students, Albany Medical College

Fourth Year Students	40
Third Year Students	47
Second Year Students	49
First Year Students	82
Total	218

STUDENTS OF THE ALBANY LAW SCHOOL

Seniors

Albert A. Arnold.....	Kingston
Bierce Bailey (Williams).....	Troy
Charles L. Bauer.....	Geneseo
John Beakley (Union)	Johnstown
Irving R. Beale (Michigan).....	Rochester
Aaron Stanley Bliss	Smithfield
Harold J. Boyne	Catskill
James A. Burnham, Jr.	Ballston Spa
Isador Bookstein	Albany
William W. Campbell	Schenectady
Albert E. Carmichael (Union).....	Schenectady
Plinio L. Castro	Cabo-Rojo, P. R.
Harry G. Coplon (Union)	Schenectady
Alexander Clapp	Rensselaer
Charles G. Coffin	Catskill
Francis H. Collins	Saranac Lake
Ralph E. Comstock	Nassau
Emory F. Crepeau.....	Arctic, R. I.
Ulpiano Crespo, Jr.	Anasco, P. R.
Croissant Martin	Albany
John O'Day Donahoe	Albany
George C. Donohue (Villanova)	Dalton, Mass.
Phillip H. Donnelly (Holy Cross)	Albany
Orville R. Dunn (Yale)	Champlain
Peter D. Dusenberre	Florida
Roscoe C. Failing (Union)	Palatine Bridge
Mateo Fajardo, Jr.	Mayaguez, P. R.
John V. Flood	Troy
Jose A. Fajardo	Mayaguez, P. R.
Harry Gottesfeld	New York City
Ernest C. Gordon	Plattsburg
Emery A. Hamblin	Albany
John F. Heffernan (Notre Dame).....	Williston, N. D.
George E. Hill	Cohoes
Park Holland	Albany

Ernest C. Hornburg	Wellsville
Frank Hurley	Glens Falls
Milton B. Ignatius	Troy
Robert H. Jackson	Frewsburg
Maximilian J. Jasolski	Schenectady
Adolf F. Johnson (Augustana)	Falconer
James E. Kelly	Troy
John E. Kelly	Schenectady
Franklin J. Kilmer	Ballston Spa
Daniel E. Lorenz	Gloversville
Francis V. V. Leary	Greene
Gardner V. V. Littell (Hobart)	Gloversville
Edward M. Lotridge	Fonda
Henry J. Mather	Whallonsburg
Francis L. McCormack	Troy
John P. McNamee	Troy
William F. Minnock	Coeymans
Arthur L. Mephram	Ontario
Loomis W. Mulford	Unadilla
Joseph B. Mulholland, ...	Troy
Raymond F. Nichol	Van Etten
Carroll J. Niles	Schenectady
Patrick H. Nulty	Ticonderoga
Thomas F. O'Bryan	Corning
John J. O'Connor (Cornell)	Auburn
Clara Pritchard	Tivoli
Clarissa Pritchard	Tivoli
Bart A. Peterson	Jamestown
Veeder W. Putnam	Fonda
Richard F. Rath	Binghamton
Howard J. Reilly	Mechanicville
Hugh Reilly (Georgetown)	Albany
Edward N. Schiberling	Albany
Sylvester E. Scott	Hoosick Falls
Fred W. Seeley	New Suffolk
Romaine Shepard	Lawrenceville
Arthur B. Shear	Catskill
William Sheehy	Millbrook
Sheldon B. Smith (Dartmouth)	Troy

Daisy L. Snook	Amsterdam
John R. Stewart	Watervliet
Wilder J. Tasker (Syracuse)	New Bedford, Mass.
Horatio W. Thomas (Clark)	Keeseville
John F. Thomas (Williams)	Troy
Horace E. Vedder (Union)	Schenectady
Vernon A. Vrooman	Albany
Holland B. Williams (Hamilton)	Corning
Harry E. Winn	Greenfield, Mass.
Clarence E. Williams, Jr.	Verona Mills
Chase W. Young	Hudson Falls

Seniors—85

Juniors

Samuel E. Aronowitz, (Dartmouth)	Albany
Benjamin Axelroad	Albany
Pedro Baiges	Amasco, P. R.
Harold E. Blodgett (Union)	Schenectady
William M. Bray (Union)	Churubusco
Paul E. Brown	Unadilla
LeRoy G. Butler	Corinth
Samuel Caplan	Albany
Horace B. Casey	Delmar
Lewis S. Clark	Binghamton
Dorothy Coleman	Hudson
Tristram Coffin (Union)	Hudson
John F. Delaney	Albany
Warren S. Fales	Troy
Gerald J. Farrell	Troy
Irvin L. Gelser (Yale)	Webster
Newell M. Goodspeed	Watervliet
Esther H. Goodstein	Albany
Bernard A. Gray (Union)	Black River
Robert G. Groves	Kingston
Leslie E. Hicks	Mechanicville
Fred Jeram	Newtonville
David I. Jersky	Troy
Edward Jones	Rutland, Vt.
Bertram P. Kavanough	Troy

Bernard W. Kearney	Schenectady
Myer J. Lavin	Albany
Ralph Levy	Malone
Theodore B. Lull	Edmeston
Joseph H. Lumpkin (Georgia)	Athens, Georgia
Charles L. McMahon	Schuylerville
Catherine S. Murphy	Hudson
Charles F. Murray (Union)	Albany
Joseph A. McGraw	Albany
James A. Noonan	Lockport
Edward J. O'Connell (Union)	Albany
Joseph P. O'Connell	Hawleyton
Thaddeus S. Ogonowski	Schenectady
Charles J. Ranney, (Holy Cross)	Troy
Charles B. Rice	Waterford
Dayton K. Rivas (Carnegie)	Schenectady
Peter A. Rogers, Jr.	Watervliet
Ogden J. Ross	Troy
Jacob Rubenstein	Rochester
D. Bernard Ryan	Albany
Alfred I. Schimpf	Canajoharie
Frank S. Sharp	Delmar
Hamlet A. Smyth (Rochester)	Rochester
Franklyn J. Stowitts	Canajoharie
Kathryn H. Starbuck (Vassar)	Saratoga Springs
James Tracey Taaffe	Albany
Water Wait	Corinth
Fred L. Webb	Salem
Eugenio Vera	San German, P. R.
Melvin G. Vernon	Florida
Juniors—55	

Summary of Students, Albany Law School

Seniors	85
Juniors	55
Total	140

STUDENTS OF THE ALBANY COLLEGE OF PHARMACY

Senior Class

Himon Alpert	Dannemora
Denis Peter Amo	Massena
James Arthur Barhydt	Schenectady
Roy Ezekiel Bates	Gloversville
Ralph Paul Branche	Gloversville
Harold William Calden	Freehold
Stanley Hune Collins	Cohoes
Raymond Thomas Carey	Greenville
Alfred Nelson Christeson	Schenectady
Harold Frank Cleveland	Cambridge
Harold John Cusson	Hoosick Falls
George V. Daily	Albany
Franklin James Demo	Massena
Martin Cleveland Dyer	Schenectady
Joseph Leo Fullem	Frankfort
Edward Grahman	Hudson
Henry Gross	Johnstown
Howard J. Hall	South Scroon
John Luverne Hemstead	Waterford
Leo Leland Kane	Greenville
Louise Dorothy Loeble	Troy
Harry Wilson Maybee	Roscoe
Thomas Ernest McClellan	Saranac Lake
John James McDonnell	Sheffield, Mass.
George A. Molony	Schenectady
Dwight Henry Mosher	Dolgeville
Hugh Cornelius Muldoon	Waverly
Bernard Hawley Nelson	Waverly
Delos Henry Norton	Troy
James William Pierson	Schenectady
Earl Bowler Port	Gloversville
Francis Joseph Real	Green Island
John Henry Robbins	Kellettville, Pa.
Claud Hamilton Sellide	Rochester
Frank James Smith, Jr.	Albany
Patrick Joseph Smith	Greenville

Victor Lee Smith	South Horicon
Henry Hiscox Sevink	Troy
Howard William Van Loon	Chatham
Carl Augustus Weber	Kingston
Sidney Arthur White	Windsor
Fred Zeitler	Gloversville

Seniors—42

Junior Class

Clarence Cleveland Abbott	Salem
David Barbes Ashton	Plattsburg
Earl David Bailie	Greenwich
Earl Secord Bander	Johnstown
Hyman Beizer	Hartford, Conn.
Norman Willden Bosworth	Troy
James Sanders Bruce	Schenectady
John H. Canfield	Hoosick Falls
Harold Chandler Clark	Saratoga Springs
Julian Blaine Clinton	Greene
Earl Cunningham	Millbrook
Frank Leslie Downes	Binghamton
Willard Andrew Durfee	Eaton
Lynn Edgecomb Ellis	Waverly
Elmer Harrison Hallock	Saranac Lake
John Joseph Healy, Jr.	Troy
Rena MacHenault	Tupper Lake
Harold Leslie Keeler	Norwich
John Edward Kelly	Albany
Robert Townsend Kinch	Walton
Perry Arthur Laplanf	Malone
Sylvester Earl McDermott	Cohoes
Fred James McIlreath	Amsterdam
Augustus Tremaine McKinstry	Hudson
Newton Kengo McNeil	Hartford
Charles Ambrose Mitchell	Cooperstown
Frederick John Mueller	Catskill
John Francis O'Brien	Mechanicville
John Francis O'Leary	Albany

Frank Bernard O'Neil	Troy
Maynard Edward Osborne	Hunter
Henry Peter Pelleim	Cohoes
Leland Patrick Quinlavin	Ilion
Herman Paul Rappold	Castleton
Herbert Edwin Reynolds	Nassau
Sarah Richardson	Cambridge
Elmer Erastus Ross	Loudonville
Russell St. Marie	Indian Lake
Minna Sanders	Albany
Charles Matthew Snyder	Rensselaer
Ralph Frederick Spaulding	Salem
Samuel Sternfeld	Albany
Chester Moore Tears	Walden
George Harold Tilton	Waverly
John Gordon Van Nostwick	South Kortwright
Everett Lewis Vrooman	Middleburg
Chester Wepper Weeks	Canajoharie
John William Wieser	Albany
Forrest Jefferson Williams	Remsen
Harry Otis Withey	Cooperstown

Juniors—50

Summary of Students, College of Pharmacy

Seniors	42
Juniors	50
Total	92

SUMMARY OF STUDENTS, UNION UNIVERSITY

Union College	336
Albany Medical College	218
Albany Law School	140
Albany College of Pharmacy	92
Total	786

INDEX

	PAGE
Absences.....	140
Admission	
Union College	
Academic Courses.....	30-42
Engineering Courses.....	89, 30
Medical College.....	171
Law School.....	183
College of Pharmacy.....	187
Dudley Observatory.....	184
Apparatus and instruments.....	105
Awards at Commencement, June 1911.....	161
Calendar	
University.....	8
Union College.....	21
Medical College.....	171
Law School.....	182
College of Pharmacy.....	187
Certificates.....	30, 31
Chapel.....	140
Civil Engineering.....	92, 99
Collections.....	69, 105
Committees	
of Trustees.....	23
of Faculty.....	26
Conditions.....	141
(See also Standing)	
Courses of Study.....	28
(See also Curriculum)	
Alternate Courses in Engineering.....	99
Change of Course.....	140
Curriculum	
Union College.....	71-82, 125-139
Medical College.....	172-174
Law School.....	183
College of Pharmacy.....	188

Degrees and Honors	PAGE
Union College	154
Medical College	179
Law School	183
College of Pharmacy	188
Degrees Conferred in 1911—Union College	138
Departments of Instruction	43
Electrical Engineering	110
Employment	145
Engineering School	88
Examinations	
Entrance (See Admissions)	
General	140, 141
(See also Standing and Conditions)	
Excuses (See Absences)	
Expenses	
Union College	143
Medical College	177
Law School	183
College of Pdarmacy	188
Faculty	
University	10
Union College	27
Engineering	90
Medical	166
Law	181
Observatory	185
Pharmacy	186
Fees (See Expenses)	
General Engineering	99
Grades (See Standing)	
Graduation	
Union College	154
Medical College	179
Law School	183
College of Pharmacy	188
Graduate Courses	154, 93, 109, 120, 123
Historical Statements	
University	7

Historical Statement— <i>Continued</i>	PAGE
Union College.....	19
Engineering School.....	88
Medical College.....	164
Law School.....	180
College of Pharmacy.....	186
Honors (See Degrees and Honors)	
Commencement.....	155
Special.....	156
(See also Awards in 1911 and Departments of Study)	
Lectures and Lecture Courses.....	67, 117
Library.....	68, 99
Laboratories.....	103, 118, 60, 62, 64
Museum.....	69
Officers	
University.....	9
Union College.....	27
Medical College.....	165
Law School.....	181
College of Pharmacy.....	186
Dudley Observatory.....	185
Physical Education.....	66
Prizes.....	151
Promotion (See Requirements)	
Registration	
For Entrance Examinations.....	30, 41
For Conditions Examinations.....	141
For Non-Resident Work toward post-graduate degrees...	155
For Special Honors.....	156
Regulations (General).....	140-145
Reports.....	140
Requirements	
For Entrance (See Admissions)	
For Promotion (See Standing)	
For Graduation (See Graduation)	
For Graduate Degree (See Graduate Courses)	
Rooms.....	144
Sanitary Engineering.....	108

	PAGE
Scholarships.....	146
Standing, how graded, maintenance of.....	140
Irregular.....	142
Advanced.....	33
Students	
Union College.....	191
Medical College.....	201
Law School.....	208
College of Pharmacy.....	212
Summary for University.....	214
Studies, order of (See Curriculum)	
Subjects of Study.....	43, 93
(See also Department Curriculum)	
Six-year Engineering Course.....	93, 133
Subjects required for Admission.....	31
Terms and Vacations.....	8
(See also Department Calendars)	
Theses.....	98
Tuition (See Expenses)	
Trustees	
Union College.....	22
Medical College.....	165
Law School.....	181
College of Pharmacy.....	186
Dudley Observatory.....	185



Union College Bulletin

University Catalogue Number
1912-1913

Vol. VI No. 1

November 1912

PUBLISHED QUARTERLY BY UNION COLLEGE

SCHENECTADY, NEW YORK

In November, February, May and August

Admitted to the mail as second-class matter

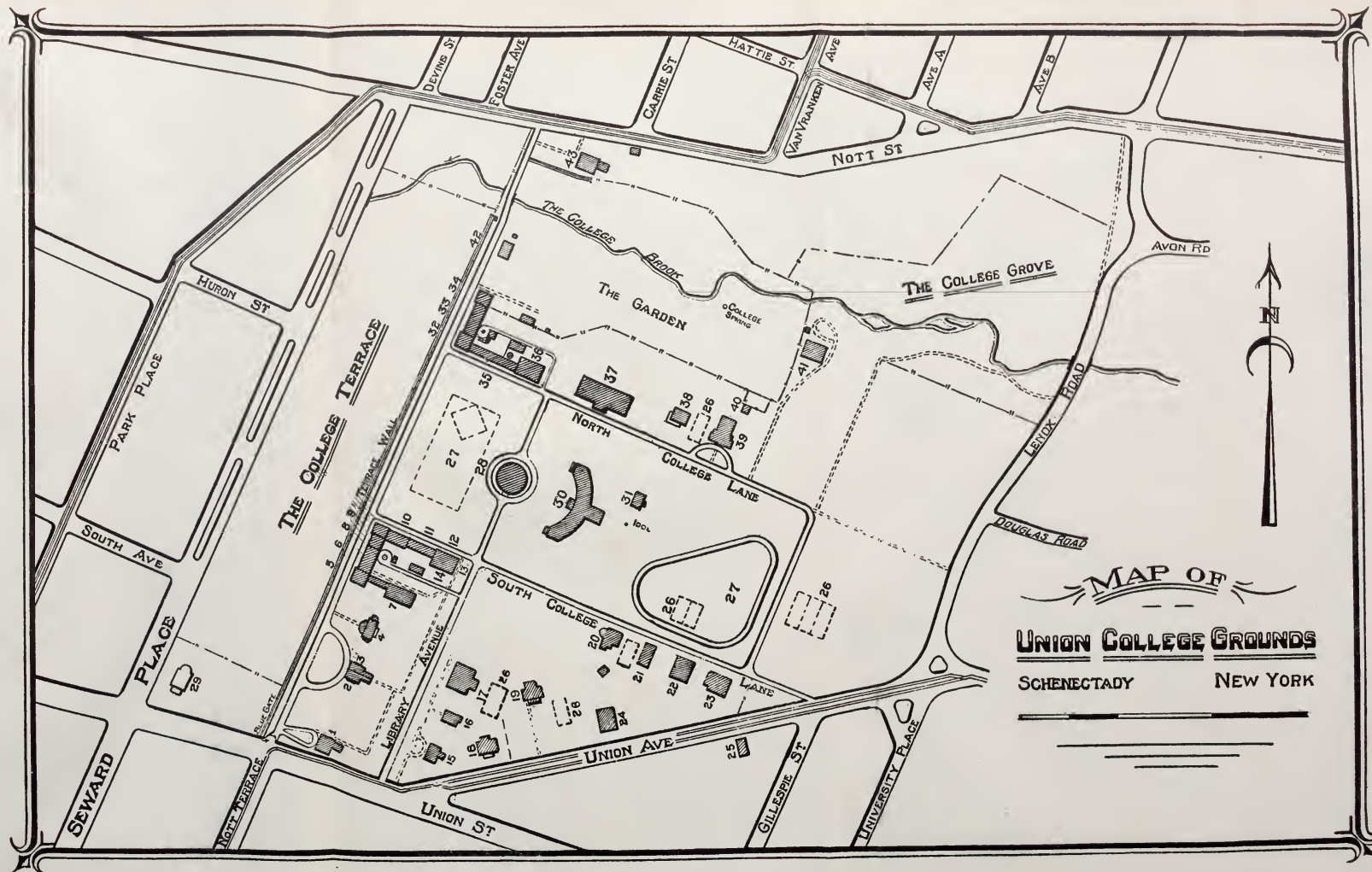
1 Pres
 2 Prof
 3 Prof
 4 Silli
 5 Prof
 6 Sout
 7 Gym
 8 $\Phi \Delta \Theta$
 9 Prof
 0 Prof
 1 Pres
 2 Clas
 3 Chap
 4 Dear
 5 Treas
 6 Biol
 7 $\Sigma \Phi$
 8 Ashr
 9 $\Delta \Delta$
 0 Well
 1 X Ψ
 2 $\Psi \Upsilon$
 3 Ass't
 4 $\Delta \Upsilon$
 5 $\Phi \Gamma$
 6 B Θ
 7 Dear
 8 Tenn
 9 Athl
 0 Nott
 1 Carn
 2 Was
 3 C
 4 S
 5 Cent
 6 Prof
 7 Nort
 8 P
 9 Θ
 0 Prof
 1 Chen
 2 Phys
 3 Gen
 4 K A
 5 Elect
 6 Care
 7 Barn
 8 Bene
 9 Prof



UNIO
 SCHEN

INDEX

- 1 President's House
- 2 Prof. Hoffman
- 3 Prof. Barnes
- 4 Silliman Hall (YMCA)
- 5 Prof. Ellery
- 6 South College Dormitory
- 7 Gymnasium
- 8 $\Phi\Delta\Theta$ House
- 9 Prof. Stoller
- 10 Prof. Hale
- 11 President's Office
- 12 Classrooms
- 13 Chapel
- 14 Dean's Office
- 15 Treasurer's Office
- 16 Biological Laboratory
- 17 (second story)
- 18 $\Sigma\Phi$ Place
- 19 Ashmore House
- 20 $\Lambda\Delta\Phi$ House
- 21 Wells House
- 22 $\chi\psi$ Lodge
- 23 $\psi\tau$ House
- 24 Asst. Treas. Dewey
- 25 $\Delta\tau$ House
- 26 $\Phi\Gamma\Delta$ House
- 27 $\Theta\Pi$ House
- 28 Dean Ripton
- 29 Tennis Courts
- 30 Athletic Field
- 31 Nott Memorial Hall
- 32 (College Library)
- 33 Carnegie (Public) Library
- 34 Washburn Hall
- 35 Class rooms and offices
- 36 Secretary's Office
- 37 Central Heating Plant
- 38 Prof. Bennett
- 39 North College Dormitory
- 40 Pyramid Club
- 41 $\Theta\Lambda\Phi$ Fraternity
- 42 Prof. McKean
- 43 Chemical Laboratory
- 44 Physics Laboratory
- 45 (second story)
- 46 General Eng'g Building
- 47 K A Lodge
- 48 Electrical Eng'g Lab.
- 49 Caretaker's House
- 50 Barn
- 51 Benedict House
- 52 Prof. Landreth



MAP OF
UNION COLLEGE GROUNDS
SCHENECTADY NEW YORK

ANNUAL CATALOGUE
OF
UNION UNIVERSITY



1912-1913

PRESS OF
FRANK H EVORY & Co
ALBANY N Y

CONTENTS

	PAGE
Map	<i>Frontispiece</i>
Union University	7
University Calendar	8
Officers of the University	9
University Faculty	10
Union College	19
Union College Calendar	21
Trustees of Union College	22
Officers of the Board of Trustees	23
Faculty of Union College	24
Standing Committees of the Faculty	26
College Officers	27
Courses of Study	28
Admission	30
Methods of Admission	30
Required Subjects	31
Entrance Examinations	40
Departments of Instruction	42
Curricula of Academic Courses	75
Schedule of Required Academic Studies	78
Schedule of Elective Studies	80
Engineering School	83
Engineering Faculty	85
General Description	87
General Engineering Department	96
Sanitary Engineering Department	109

Union College	PAGE
Engineering School— <i>Continued.</i>	
Electrical Engineering Department.....	110
Curricula of Engineering Courses.....	126
Attendance and Standing.....	139
Expenses.....	142
Scholarships.....	145
Prizes.....	150
Degrees and Honors.....	154
Degrees and Awards in 1912.....	158
Albany Medical College.....	164
Albany Law School.....	180
Dudley Observatory.....	184
Albany College of Pharmacy.....	186
Students, Union University.....	190
Summary.....	216
Index.....	217

UNION UNIVERSITY

Union University embraces the following institutions:

UNION COLLEGE, Founded 1795

Academic Department	{	Classical Course
		Latin Scientific Course
		Scientific Course
Engineering Department	{	General Engineering Course
(Founded 1845)		Sanitary Engineering Course
		Electrical Engineering Course

ALBANY MEDICAL COLLEGE, Founded 1838

ALBANY LAW SCHOOL, Founded 1851

DUDLEY OBSERVATORY, Founded 1852

ALBANY COLLEGE OF PHARMACY, Founded 1881

Union College acquired by its charter, granted in 1795, full university powers, but the creation of graduate institutions at Schenectady was not then found practicable. Schools of law and medicine and also an astronomical observatory have long existed at Albany, only a few miles distant. The arrangement naturally suggested by these circumstances was, that the professional schools and the observatory at Albany should be united with Union College, under the charter and board of trustees of the latter. This was accordingly effected by the incorporation of Union University in 1873. The Albany College of Pharmacy was created by the board of governors on June 21, 1881, and incorporated as a department of the university on August 21 of the same year.

The president of Union College and permanent chancellor of Union University has the oversight of the university, each of the institutions having its resident dean. The dean of Union College acts in the place of the president in his absence and also assists him in matters delegated to him by the president. The university board of governors is composed of permanent trustees of Union College and of representatives of each of the other institutions embraced in Union University.

1912 — UNIVERSITY CALENDAR — 1913

1912

Fall term of Union College begins.....Monday, September 16
 First semester of Law School begins.....Tuesday, September 17
 Winter term of Medical College begins..Tuesday, September 24
 Winter term of College of Pharmacy begins..Monday, October 7
 Election day — recess.....Tuesday, November 5
 Thanksgiving day — recess.....Thursday, November 28
 Fall term of Union College ends.....Saturday, December 21

Christmas recess in all departments

1913

Sessions resumed.....Thursday-Saturday, January 2-4
 Day of prayer for colleges.....Thursday, January 23
 First semester of Law School ends.....Friday, January 31
 Second semester of Law School begins.....Monday, February 3
 Washington's birthday — recess.....Saturday, February 22
 Winter term of Union College ends.....Thursday, March 20
 Spring term of Union College begins.....Tuesday, March 25
 Easter recess.....Friday-Monday, March 21-24
 Commencement, College of Pharmacy.....Tuesday, April 29
 Commencement, Medical College.....Tuesday, May 27
 Commencement, Law School.....Thursday, June 5
 Commencement week, Union College

Sunday-Wednesday, June 8-11

Entrance examinations, Union College

Thursday-Friday, June 12-13

Fall term of Union College begins.....Monday, September 15
 First semester of Law School begins.....Tuesday, September 23
 Winter term of Medical College begins...Tuesday, September 23
 Winter term of College of Pharmacy begins..Monday, October 6
 Election day — recess.....Tuesday, November 4
 Thanksgiving day — recess.....Thursday, November 27
 Fall term of Union College ends.....Tuesday, December 23

For calendars of departments, see Pages 21, 171, 182, 187.

OFFICERS OF THE UNIVERSITY

Chancellor

REV. CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Honorary Chancellor, 1912

WILLIAM MILLIGAN SLOANE, Ph. D., LL. D.

Board of Governors

President, SIMON W. ROSENDALE, LL. D., Albany

Secretary, J. NEWTON FIERO, LL. D., Albany

Union College

SILAS B. BROWNELL, LL. D.....	New York City
EDWARD WINSLOW PAIGE, LL. D.....	New York City
GEORGE ALEXANDER, D. D.....	New York City
WARNER MILLER, LL. D.....	Herkimer
NICHOLAS V. V. FRANCHOT, A. M.....	Olean
EDWIN W. RICE, JR., PH. D., SC. D.....	Schenectady
EDWARD P. WHITE, A. M.....	Buffalo
ALONZO P. STRONG, A. B.	Schenectady
EDGAR S. BARNEY, SC. D.....	New York City
WILLIAM F. HAVEMEYER.....	New York City
FRANKLIN H. GIDDINGS, LL. D.....	New York City

Albany Medical College

SIMON W. ROSENDALE, LL. D.....	Albany
ALDEN CHESTER	Albany

Albany Law School

AMASA J. PARKER, LL. D.....	Albany
J. NEWTON FIERO, LL. D.....	Albany

Dudley Observatory

SAMUEL B. WARD, M. D., PH. D.....	Albany
BENJAMIN WALWORTH ARNOLD.....	Albany

Albany College of Pharmacy

WILLIS G. TUCKER, M. D., PH. D.....	Albany
CHARLES NEWMAN	Albany

UNIVERSITY FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean of Union College and Professor of History and Government

SAMUEL B. WARD, M. D., PH. D.
Dean of the Medical College and Professor of Theory and
Practice of Medicine

J. NEWTON FIERO, LL. D.
Dean of the Law School and Lecturer on Procedure, Equity,
Torts, Evidence and Wills

*LEWIS BOSS, A. M., LL. D.
Director of the Dudley Observatory

BENJAMIN BOSS, A. B.
Acting Director of Dudley Observatory

WILLIS G. TUCKER, M. D., PH. D.
Dean of the College of Pharmacy, Registrar of the Medical
College, and Professor of Chemistry and Toxicology

ALBERT VANDER VEER, M. D., PH. D., LL. D.
Professor of Surgery

JOHN M. BIGELOW, M. D., PH. D.
Professor Emeritus of Materia Medica, Therapeutics and
Diseases of the Throat and Nose

JAMES P. BOYD, M. D.
Professor of Obstetrics and Diseases of Children

CYRUS S. MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC C. CURTIS, M. D.
Professor of Dermatology

ALFRED B. HUESTED, M. D., PH. G.
Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.
Professor Emeritus of Pharmacy

HENRY HUN, M. D.

Professor of Diseases of the Nervous System

SAMUEL R. MORROW, M. D.

Professor of Practice of Surgery and of Orthopedic Surgery

FRANK S. HOFFMAN, A. M., PH. D.

Ichabod Spencer Professor of Philosophy

OLIN H. LANDRETH, A. M., C. E., Sc. D.

Professor of Civil Engineering

HERMAN C. GORDINIER, M. D.

Professor of Physiology

JAMES H. STOLLER, A. M., PH. D.

Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.

Professor of the English Language and Literature

LEWIS R. PARKER

Professor of the Law of Bailments, Bills and Notes, Guarantee and Suretyship, and Constitutional Law

HOWARD VAN RENSSELAER, M. D.

Professor of Materia Medica and Therapeutics, and Adjunct Professor of Theory and Practice of Medicine

JOSEPH D. CRAIG, M. D.

Professor of Anatomy, and Curator of the Museum

FLETCHER W. BATTERSHALL

Professor of the Law of Persons and Property, Domestic Relations and Partnership

CHARLES P. STEINMETZ, A. M., PH. D.

Professor of Electrical Engineering

JOHN I. BENNETT, A. B.

Professor of the Greek Language and Literature

HOWARD OPDYKE, A. B.

Professor of Physics

EDWARD ELLERY, A. M., PH. D., Sc. D.

Professor of Chemistry

FRANK WHITE

Professor of the Law of Corporations

GEORGE LAWYER

Professor of the Law of Contracts, Personal Property and Sales,
and Bankruptcy

FRANK B. GILBERT

Professor of the Law of Real Property, Statutes and Statutory
Construction

FRANK C. BARNES, A. M., PH. D.

Professor of Modern Languages

HORACE G. McKEAN, A. M.

Professor of Rhetoric and Public Speaking

ANDREW MacFARLANE, M. D.

Professor of Physical Diagnosis and Medical Jurisprudence

ARTHUR G. ROOT, M. D.

Professor of Diseases of the Throat and Nose

LEO NEUMAN, M. D.

Professor of Gastro-Enteric Diseases, and Clinical Professor of
the Theory and Practice of Medicine

JACOB C. E. SCOTT

Professor of Criminal Law

STEWART A. McCOMBER, A. M., M. D.

Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.

Professor of Mathematics

JAMES B. KENNEDY, PH. D.

Professor of Economics and Sociology

GEORGE D. KELLOGG, PH. D.

Professor of the Latin Language and Literature

ARTHUR W. ELTING, M. D.

Professor of the Practice of Surgery and of Clinical Surgery

EDGAR A. VANDER VEER, M. D.

Professor of Abdominal and Clinical Surgery

JOHN A. SAMPSON, M. D.

Professor of Gynecology

FREDERICK W. CAMERON

Professor of the Law of Patents, Copyright, and Trade Marks

CHARLES J. HERRICK

Professor of Civil Law, International Law, and Conflict of Laws

HARRY S. BERNSTEIN, M. D.

Professor of Pathology and Bacteriology

HON. IRVING G. VANN, LL. D.

Lecturer on the Law of Insurance

HON. ALDEN CHESTER

Lecturer on the Federal Judicial System

FREDERICK D. COLSON

Lecturer on Books and Their Uses

RUDOLPH EUCKEN, PH. D., D. D.

Ichabod Spencer Lecturer on Psychology

JOHN L. MARCH, A. M., PH. D.

Adjunct Professor of Modern Languages

SPENCER L. DAWES, M. D.

Adjunct Professor of Materia Medica, and Director of
Microscopical Laboratory

LA SALLE ARCHAMBAULT, M. D.

Adjunct Professor of Neurology

ROBERT W. KEETON, M. S.

Adjunct Professor of Physiological Chemistry and Experimental
Physiology

GARRET VANDER VEER DILLENBACK, PH. G.

Associate Professor of Pharmacy

HERMAN BENDELL, M. D.

Clinical Professor of Otology

JESSE M. MOSHER, M. D.

Clinical Professor of Insanity, Neurology and Electro-
Therapeutics

HARRY J. LIPES, M. D.

Clinical Professor of Obstetrics

ARTHUR SAUTTER, M. D.

Clinical Professor of Dermatology and Lecturer on Venereal
Diseases

GEORGE E. LOCHNER, M. D.

Clinical Professor of Obstetrics

CLEMENT F. THEISEN, M. D.
Clinical Professor of Diseases of the Throat and Nose

HENRY L. K. SHAW, M. D.
Clinical Professor of Diseases of Children

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON C. STEWART, PH. D.
Assistant Professor of German

WALTER L. UPSON, E. E., M. S., M. E. E.
Assistant Professor of Electrical Engineering

STANLEY P. CHASE, PH. D.
Assistant Professor of English

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

ARTHUR J. ROY, C. E., A. M.
Assistant in Dudley Observatory

WILLIAM O. STILLMAN, M. D.
Lecturer on the History of Medicine

CHARLES H. MOORE, M. D.
Lecturer on Ophthalmology and Otology

WILLIAM B. VARNUM, A. B.
Assistant in Dudley Observatory

JAMES F. ROONEY, M. D.
Lecturer on Hygiene and Instructor in Medicine

HOWARD E. LOMAX, M. D.
Lecturer and Demonstrator of Anatomy

GEORGE G. LEMPE, M. D.
Lecturer on Minor Surgery

WILLIAM A. LARKIN, M. D., PH. G.
Lecturer on Inorganic Chemistry, and Instructor in Physics and
Chemistry
Assistant Registrar of the Medical College

JAMES N. VANDER VEER, M. D.

Lecturer on Surgical Technic and Instructor in Genito-
Urinary Surgery

ARTHUR J. BEDELL, M. D.

Lecturer on Ophthalmology

JAMES W. WILTSE, M. D.

Lecturer on Dermatology and Genito-Urinary Diseases

JOHN H. GUTMANN, M. D.

Lecturer on Surgery

JOSEPH L. DONHAUSER

Lecturer on Surgical Diagnosis

J. L. R. HAYDEN

Lecturer on Arc Lighting and Photometry, and Supervisor of
Electrical Engineering Thesis Work

ALVAH H. TRAVER, M. D.

Lecturer on Clinical Surgery and Instructor in Surgery

CLINTON B. HAWN, M. D.

Lecturer on Clinical Microscopy

CLINTON P. McCORD, M. D.

Lecturer on Histology and Embryology

JOHN McW. BERRY, M. D.

Lecturer on Radiography

WARREN L. BRADT, PH. G.

Lecturer on Pharmaceutical Jurisprudence

EDGAR R. STILLMAN, M. D.

Instructor in Physiology

EDWIN C. HUTMAN, PH. G.

Director of Pharmaceutical Laboratory

CHARLES K. WINNE, JR., M. D.

Instructor in Theory and Practice of Medicine

JOSEPH A. LANAHAN, M. D.

Instructor in Dermatology and Venereal Diseases

HARRY RAYMOND, A. B.

Assistant in Dudley Observatory

JAMES H. CUNNINGHAM, M. E. E.

Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

GEORGE E. BEILBY, M. D.
Instructor in Surgical Pathology

BRANSON K. DE VOE, M. D.
Instructor in Anatomy

EUGENE E. HINMAN, M. D.
Instructor in Diseases of the Throat and Nose

MALCOLM DOUGLAS, M. D.
Instructor in Physical Diagnosis and Therapeutics

ERASTUS CORNING, M. D.
Instructor in Theory and Practice of Medicine and Physical
Diagnosis

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

LEROY S. BLATNER, D. D. S.
Instructor in Oral Pathology

WILLIAM KIRK, M. D.
Instructor in the Anatomy and Physiology of the Nervous System

WALTER A. REYNOLDS, M. D.
Assistant Demonstrator of Anatomy, and Assistant Curator of
the Museum

JEROME MEYERS, M. B.
Instructor in Physical Diagnosis

JARED W. SCUDDER, A. M.
Instructor in Latin

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

MEADE L. ZIMMER, A. M.
Assistant in Dudley Observatory

RICHARD A. LAWRENCE, M. D.
Instructor in Obstetrics

HAROLD P. SAWYER, M. D.
Instructor in Clinical Microscopy

THEOBALD F. DOESCHER, M. D.
Instructor in Physiological Chemistry and Gastro-Enteric
Diseases

NELSON K. FROMM, M. D.
Instructor in Materia Medica

TIFFANY LAWYER, M. D.
Instructor in Gynecology

EDWIN L. DRAPER, M. D.
Instructor in Surgery and Surgical Pathology

WILLIAM G. KEENS, M. D.
Instructor in Diseases of Throat and Nose

WILLIAM W. GIBSON, PH. G.
Instructor in Commercial Pharmacy

WALTER S. HASTINGS, A. M.
Instructor in French

HARRY H. DRAKE, M. D.
Instructor in Anatomy

JOSEPH A. COX, M. D.
Instructor in Obstetrics

JOSEPH L. BENDELL, M. D.
Instructor in Surgery

CHARLES G. ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

ALBERT J. SALATHE
Instructor in Chemistry

ARTHUR L. MAXON
Instructor in Greek and Mathematics

CHARLES N. WALDRON
Instructor in American History

LA VERNE A. BOUTON, M. D.
Instructor in Anatomy

WARDNER D. AYER, M. D.
Instructor in Histology, Pathological Anatomy, and Bacteriology

RALPH E. MYERS, A. M.
Instructor in Pharmacology, Physiological Chemistry and
Physiology

FREDERIC C. CONWAY, M. D.
Instructor in Physical Diagnosis

JOHN SOUTHWELL, M. D.
Instructor in Surgery

PAUL T. HARPER, M. D.
Instructor in Obstetrics

HARRY E. ROBIE, PH. G.
Instructor in Pharmacy and Mathematics

HARRY W. BAKER, PH. G.
Instructor in Pharmacy

RICHARD B. GRAY, M. D.
Assistant in Microscopical Laboratory

LEROY JENKINS, A. B.
Assistant in Dudley Observatory

LEROY Z. MEARNS, C. E.
Assistant in Dudley Observatory

WILLIAM HUNT
Assistant in Dudley Observatory

THOMAS W. JENKINS, M. D.
Assistant Instructor in Histology

CHARLES W. L. HACKER, M. D.
Assistant Instructor in Histology and Pathology

WALTER C. FOX, M. D.
Assistant Instructor in Pathology and Bacteriology

UNION COLLEGE

Union College was incorporated by the Regents of the University of the State of New York on the 25th day of February, 1795. It was the second college incorporated in the state, and the first north of the city of New York and west of the Hudson river. It received its name from the circumstance that several religious denominations co-operated in its organization, and it was the first college in the United States which was not of a strictly denominational character. It has continued from its foundation to be a representative institution of Christian unity.

The first president of Union College was the Rev. John Blair Smith, of Philadelphia. He was elected in 1795, and resigned in 1799, only a few months before his death. He was succeeded by Jonathan Edwards, the younger, who died in 1801. The Rev. Jonathan Maxcy, previously president of Brown University, succeeded Dr. Edwards, resigning at the end of two years. In 1804 the Rev. Eliphalet Nott was elected president of Union College, which office he held until his death, on the 29th day of January, 1866. The Rev. Laurens P. Hickok, a graduate of the college, who had long acted as vice-president, was elected his successor. He resigned in 1868. The Rev. Charles A. Aiken succeeded Dr. Hickok in 1869, and resigned in 1871. The Rev. Eliphalet Nott Potter was elected president in 1871, and was inaugurated June 20, 1872. On his resignation, in 1884, the Hon. Judson S. Landon was appointed president *ad interim*, and served until the inauguration of Harrison E. Webster, who was elected president May 23, 1888, and inaugurated June 26, 1888. On his resignation, in January, 1894, Rev. Andrew V. V. Raymond was elected president, and was inaugurated in June, 1894. Dr. Raymond resigned July 18, 1907, and the Rev. George Alexander was appointed president *ad interim*. On January 28, 1909, Rev. Charles Alexander Richmond was elected president. Dr. Richmond was inaugurated June 7, 1909.

1912

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
Sept.	1	2	3	4	5	6	7	Nov.	..	..	..	..	..	1	2
	8	9	10	11	12	13	14		3	4	5	6	7	8	9
	15	16	17	18	19	20	21		10	11	12	13	14	15	16
	22	23	24	25	26	27	28		17	18	19	20	21	22	23
	29	30	..	..	..	..	..		24	25	26	27	28	29	30
Oct.	..	..	..	..	..	..	..	Dec.	..	2	3	4	5	6	7
	..	..	..	..	..	..	..		1	2	3	4	5	6	7
	..	..	1	2	3	4	5		8	9	10	11	12	13	14
	6	7	8	9	10	11	12		15	16	17	18	19	20	21
	13	14	15	16	17	18	19		22	23	24	25	26	27	28
	20	21	22	23	24	25	26		29	30	31	..	..	..	..
	27	28	29	30	31	..	..		..	..	..	..	..	..	..

1913

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
Jan.	..	..	..	1	2	3	4	July	..	..	..	..	..	..	..
	5	6	7	8	9	10	11		..	..	..	2	3	4	5
	12	13	14	15	16	17	18		6	7	8	9	10	11	12
	19	20	21	22	23	24	25		13	14	15	16	17	18	19
	26	27	28	29	30	31	..		20	21	22	23	24	25	26
Feb.	..	..	..	..	..	..	1	Aug.	..	..	..	..	..	..	..
	..	..	..	..	..	..	8		..	..	..	..	..	..	..
	2	3	4	5	6	7	8		..	..	..	..	..	..	..
	9	10	11	12	13	14	15		3	4	5	6	7	8	9
	16	17	18	19	20	21	22		10	11	12	13	14	15	16
Mar.	23	24	25	26	27	28	..	Sept.	17	18	19	20	21	22	23
	..	..	..	..	..	..	1		24	25	26	27	28	29	30
	..	..	..	..	..	..	8		31	..	..	..	..	..	..
	2	3	4	5	6	7	8		..	..	..	..	..	..	..
	9	10	11	12	13	14	15		..	1	2	3	4	5	6
Apr.	16	17	18	19	20	21	22	Oct.	7	8	9	10	11	12	13
	23	24	25	26	27	28	29		14	15	16	17	18	19	20
	30	31	..	..	..	..	..		21	22	23	24	25	26	27
	..	..	..	..	..	..	..		28	29	30	..	..	..	..
	..	..	1	2	3	4	5		..	..	..	1	2	3	4
May	6	7	8	9	10	11	12	Nov.	5	6	7	8	9	10	11
	13	14	15	16	17	18	19		12	13	14	15	16	17	18
	20	21	22	23	24	25	26		19	20	21	22	23	24	25
	27	28	29	30	..	..	..		26	27	28	29	30	31	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
June	..	..	..	1	2	3	..	Dec.	..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	1	2	3	4	5	6	7		..	1	2	3	4	5	6
	8	9	10	11	12	13	14		7	8	9	10	11	12	13
	15	16	17	18	19	20	21		14	15	16	17	18	19	20
	22	23	24	25	26	27	28		21	22	23	24	25	26	27
	29	30	..	..	..	..	..		28	29	30	31	..	..	..

Figures in heavy type indicate days on which Union College is in session

UNION COLLEGE CALENDAR

1912

Conditions examinations.....	Saturday, September 14
Registration day for freshmen.....	Monday, September 16
Entrance examinations....	Tuesday-Wednesday, September 17-18
Registration.....	Tuesday-Wednesday, September 17-18
First chapel exercises and recitations....	Thursday, September 19
Senior reception to entering students.....	Friday, September 20
Election day — recess.....	Tuesday, November 5
Thanksgiving day — recess, three days..	Thursday, November 28
Allison-Foote prize debate.....	Friday, December 6
Conditions examinations.....	Friday-Saturday, December 6-7
Fall term ends.....	Saturday, December 21

1913

Registration day for students, winter term..	Thursday, January 2
Recitations begin	Friday, January 3
Day of prayer for colleges.....	Thursday, January 23
Washington's birthday.....	Saturday, February 22
Conditions examinations..	Friday-Saturday, February 28-March 1
Winter term ends.....	Thursday, March 20
Easter recess.....	Friday-Monday, March 21-24
Registration day for students, spring term....	Tuesday, March 25
Recitations begin	Wednesday, March 26
Selection of junior and sophomore orators.....	Tuesday, April 15
Conditions examinations.....	Friday-Saturday, May 2-3
Presentation of prize essays.....	Thursday, May 15
Senior examinations end.....	Friday, May 23
Memorial day	Friday, May 30
Spring term examinations end.....	Saturday, June 7
Baccalaureate sermon.....	Sunday, June 8
Prize oratory of juniors and sophomores.....	Monday, June 9
Meeting of trustees, societies, alumni.....	Tuesday, June 10
President's reception.....	Tuesday, June 10
Commencement, second Wednesday in June..	Wednesday, June 11
Entrance examinations.....	Thursday-Friday, June 12-13
Conditions examinations.....	Saturday, September 13
Fall term, 1913-1914, begins.....	Monday, September 15

TRUSTEES OF UNION COLLEGE

Ex-Officio. { HIS EXCELLENCY JOHN A. DIX, Governor
 HON. THOMAS F. CONWAY, Lieutenant-Governor
 HON. EDWARD LAZANSKY, Secretary of State
 HON. WILLIAM SOHMER, Comptroller
 HON. JOHN J. KENNEDY, Treasurer
 HON. THOMAS J. CARMODY, Attorney-General

SILAS B. BROWNELL, LL. D., 71 Wall street, New York

HON. EDWARD W. PAIGE, LL. D., 46 Cedar street, New York

REV. GEORGE ALEXANDER, D.D., 47 University place, New York

HON. WARNER MILLER, LL. D., Herkimer

HON. NICHOLAS V. V. FRANCHOT, A. M., Olean

EDWIN W. RICE, JR., PH. D., Sc. D., Schenectady

EDWARD P. WHITE, A. M., Buffalo

EDGAR S. BARNEY, Sc. D., 36 Stuyvesant street, New York

WILLIAM F. HAVEMEYER, 32 Nassau street, New York

PROF. FRANKLIN H. GIDDINGS, LL. D., Columbia University, New York.

HON. ALONZO P. STRONG, A. B., Schenectady

COURTLAND V. ANABLE, A. B., 31 Nassau street, New York

WILLIS T. HANSON, Schenectady

FRANK BAILEY, ART. D., 175 Remsen street, Brooklyn

FREDERICK W. CAMERON, A. M., Albany, term of office
 expiring June, 1913

WILLIAM PLATT ADAMS, A. B., Red Hook, term of office
 expiring June, 1914

CHARLES B. McMURRAY, A. M., Troy, term of office expiring
 June, 1915

G. HARWOOD DUDLEY, A. B., Johnstown, term of office
 expiring June, 1916

Chairman of the Board

SILAS B. BROWNELL, LL. D.

Treasurer

FRANK BAILEY, ART. D.

Secretary

EDGAR S. BARNEY, SC. D.

Finance Committee

NICHOLAS V. V. FRANCHOT, A. M.

COURTLAND V. ANABLE, A. B.

FRANK BAILEY, ART. D.

HON. SILAS B. BROWNELL, LL. D.

WILLIS T. HANSON

EDWIN W. RICE, JR., PH. D., SC. D.

HON. ALONZO P. STRONG, A. B.

Education Committee

REV. GEORGE ALEXANDER, D. D.

COURTLAND V. ANABLE, A. B.

FRANK BAILEY, ART. D.

EDGAR S. BARNEY, SC. D.

PROF. FRANKLIN H. GIDDINGS, LL. D.

WILLIAM F. HAVEMEYER

HON. EDWARD W. PAIGE, LL. D.

Committee on Plant

CHARLES B. McMURRAY, A. M.

WILLIAM P. ADAMS, A. B.

FREDERICK W. CAMERON, A. M.

G. HARWOOD DUDLEY, A. B.

WILLIS T. HANSON

EDWIN W. RICE, JR., PH. D., SC. D.

Committee of Resident Trustees

WILLIS T. HANSON

EDWARD W. PAIGE, LL. D.

EDWIN W. RICE, JR., PH. D., SC. D.

HON. ALONZO P. STRONG, A. B.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
Professor of History and Government

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

OLIN H. LANDRETH, A. M., C. E., Sc. D.
Professor of Civil Engineering

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

JOHN I. BENNETT, A. B.
Professor of the Greek Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D., Sc. D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Secretary
Professor of Modern Languages

HORACE GRANT McKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.
Professor of Mathematics

JAMES BOYD KENNEDY, PH. D.
Professor of Economics and Sociology

GEORGE DWIGHT KELLOGG, PH. D.
Professor of the Latin Language and Literature

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON COLLINS STEWART, PH. D.
Assistant Professor of German

STANLEY PERKINS CHASE, PH. D.
Assistant Professor of English

WALTER LYMAN UPSON, E. E., M. S., M. E. E.
Assistant Professor of Electrical Engineering

JAMES H. CUNNINGHAM, M. E. E.
Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

WALTER SCOTT HASTINGS, A. M.
Instructor in French

CHARLES B. ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

ALBERT JACOB SALATHE, A. M.
Instructor in Chemistry

ARTHUR L. MAXON, A. B.
Instructor in Greek and Mathematics

CHARLES N. WALDRON, B. S.
Instructor in American History

DEWITT CLINTON.
Librarian

Ichabod Spencer Lecturers on Psychology

RUDOLF EUCKEN, PH. D., D. D.

EDWARD LEE THORNDIKE, A. M., PH. D.

Standing Committees of the Faculty

EDUCATION — Professors Ripton, Hoffman, Landreth, Stoller, Hale, Steinmetz, Bennett, Opdyke, Ellery, Barnes, March, McKean, McComber, Garis, Kennedy, Kellogg, Garrison, Upson

ADMISSIONS — Professors Barnes, Ripton, Garis, Landreth, Hale, Bennett, Opdyke, March, Kellogg, Garrison, Upson

STAGE APPOINTMENTS — Professors McKean, Ellery, March, Lyon, Chase

LIBRARY — Professors Hale, Landreth, Bennett and the Librarian

SCHOLARSHIPS — Professors Ripton, Bennett, Ellery

DISCIPLINE — Professors Ripton, Landreth, Hale, Bennett, Opdyke, March

STUDENT ACTIVITIES — Professors Opdyke, Bennett, McComber, McKean, Hale

SCHEDULE — Professors Garis, Mr. King, Mr. Taylor

ABSENCES — Professors Ellery, March, Mr. King

CATALOGUE — Professors Barnes, Opdyke, Garis

CONVENTIONS — Professors March, Landreth, Mr. Cunningham

PREPARATORY SCHOOLS — Professors Barnes, Ellery, Garis, Kellogg, Mr. King

SENIOR CLASS — Professor Bennett, Lyon, Stewart

JUNIOR CLASS — Professors March, Kellogg, McKean

SOPHOMORE CLASS — Professors King, Chase, Kennedy

FRESHMAN CLASS — Professors Garis and McComber, Mr. Taylor

COLLEGE OFFICERS

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

President

President's Rooms, South Colonnade

Consultation hour 12-1 daily

BENJAMIN H. RIPTON, PH. D., LL. D.

Dean

College Office

Office Hours 2:30-4 P. M.*

FRANK BAILEY, ART. D.

Treasurer

175 Remsen St., Brooklyn

HARTLEY F. DEWEY

Assistant Treasurer

College Office

Office Hours 8 A. M.-5 P. M.*

FRANK COE BARNES, PH. D.

Secretary

Room I, Washburn Hall

Office Hours 3-5 P. M.*

JAMES H. STOLLER, PH. D.

Curator of the Museum

DEWITT CLINTON

Librarian

Library Hours 8 A. M.-1 P. M., 2-6 P. M.*, 7:30-9 P. M.

ESTHER G. ELY, Recorder, and Secretary to the Dean

JANE TUPER, Clerk to the Secretary

ANNE O'N. BEATTIE, Secretary to the President

ALMIRA R. WILCOX, Cataloguer in Library

*Except Saturday P. M.

COURSES OF STUDY

1. Courses leading to the Degree of A. B.

Classical Course A. Greek, as indicated on p. 42, is required for admission to this course. Latin and Greek are required for two years, and are elective for the remainder of the course. Modern languages are elective in the junior and senior years.

Classical Course B. This course may be pursued by candidates who satisfy the requirements for admission to the Ph. B. course. Greek is begun on entrance and required for four years. In other respects Course B is virtually identical with Course A.

Course B will not be offered in this form after 1912-13. See page 43.

2. Course leading to the Degree of Ph. B.

Latin-Scientific Course. This course offers Latin without Greek, for which is substituted additional work in modern languages and science.

3. Course leading to the Degree of B. S.

Scientific Course. This course is based upon the study of mathematics and the sciences, with extended work in English and other modern languages.

In courses 1, 2 and 3 the work of the last two years is elective.

4. Courses leading to the Degree of B. E.

General Engineering Course. This course offers the foundation of a broad engineering education, comprising mathematics, the sciences, the fundamental principles of the special branches of the profession, some training in history and economics, a knowledge of both French and German and a course in English. During the third and fourth years two alternative options are offered.

Option A. In this division the fundamental principles of advanced technical subjects receive emphasis.

Option B. In this division studies are offered which lead to a training for engineering positions of an executive or administrative nature.

Six-Year Ph. B.-B. E. Course. This course combines the above four-year engineering course, including both its options, with the Latin scientific course. The subjects of the two courses are interwoven throughout each term and the course thus offers in carefully arranged form a combined college and technical training.

Sanitary Engineering Course. This differs from the general engineering course by substituting special work in sanitary engineering for some of the general engineering studies.

Electrical Engineering Course. This course is intended to give a broad and thorough engineering education, with the specific instruction requisite for electrical engineering.

5. Courses leading to Graduate Degrees

Course leading to degree of M. C. E. This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the general or the sanitary engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of M. E. E. This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the electrical engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of Ph. D. This course of two years' graduate study requires for admission the degree of M. E. E. or an equivalent. For details of the work see page 124.

Students in full standing at the end of junior year who have the profession of medicine in view are permitted to take the first year studies of the Albany Medical College as a substitute for the studies of the senior year in Union College. This enables medical students to lessen the time of their academic and professional studies by one year.

REQUIREMENTS FOR ADMISSION

Application and Registration

Blank forms of application to be filled out and forwarded in advance will be furnished by the secretary on request.

Candidates must be at least sixteen years old, and as a preliminary to registration, whether for examination or for enrollment, must present themselves at the office of the secretary on the date named in the calendar published in the college catalogue for the current year, and submit satisfactory testimonials of character.

Methods of satisfying the Requirements

By Examination. The regular entrance examinations are held on the Thursday and Friday immediately following Commencement, and on the Tuesday and Wednesday of the first week of the fall term. The schedule of examinations is given on pages 40-41. Candidates for examination in any subject are expected to present a recommendation from their school principal.

By C. E. E. B. Certificate. Candidates may take the uniform entrance examinations offered by the College Entrance Examination Board. The examinations of the board are held in June of each year, and a list of the places at which they are to be held is published by the board about March 1st. Applications to attend the board's examinations must be addressed to the *Secretary of the College Entrance Examination Board, P. O. Sub-Station 84, New York, N. Y.*, and must be made upon a blank form to be obtained from the secretary of the board upon application. The certificates of this board will be accepted for all subjects passed at a satisfactory grade.

By Regents Diploma. The academic and college entrance diplomas issued by the New York State Education Department will be accepted so far as they cover the requirements for admission to the course desired.

By School Certificate. Certificates from schools approved by the faculty will be accepted for graduates of the school if they

cover the requirements for admission to the course desired and contain a recommendation from the principal of the school that the candidate be admitted to college. Blank certificates, to be filled out by principals of schools, will be furnished upon application to the *Secretary of the Faculty, Union College, Schenectady, N. Y.*

So far as possible all credentials should be forwarded by July 10 of the year in which the candidate desires to enter, and it is expected that all certificates will be submitted not later than September 1st.

Students who enter the freshman class by certificate and fail to maintain their class standing are required to pass entrance examinations in the departments in which they have failed, if they apply for readmission.

Subjects Required for Admission to Each Course

Candidates for admission to the freshman class in any course must meet the requirements specified for that course. The subjects are numbered as in the general list given on pages 32-40.

The term *unit* is used in this catalogue in the sense established by the Carnegie Foundation and the College Entrance Examination Board, and means a course of 4 or 5 periods weekly throughout an academic year of the preparatory school.

A.B. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
2. Greek: a, b, c.....	See Page 35.....	3 units
3. Latin: a, b, c, d.....	See Page 36.....	4 units
5. Mathematics: a, b.....	See Page 37.....	2½ units
7. History: a, b, c.....	See Page 40.....	2 units
8. Electives.....	See Page 40.....	½ unit

Total 15 units

Ph.B. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
3. Latin: a, b, c, d.....	See Page 35.....	4 units
4. Modern Languages: a or b...	See Page 36.....	2 units
5. Mathematics: a, b.....	See Page 37.....	2½ units
7. History: a, b, c.....	See Page 40.....	2 units
8. Electives.....	See Page 40.....	½ unit

Total 14 units

B.S. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
4. Modern Languages: a or b...	See Page 36.....	2 units
5. Mathematics: a, b, c.....	See Page 37.....	3 units
6. Science.....	See Page 39.....	1½ units
7. History: c.....	See Page 40.....	1 unit
8. Electives.....	See Page 40.....	3½ units

Total 14 units

B.E. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
4. Modern Languages: a or b...	See Page 36.....	2 units
5. Mathematics: a, b, c, d.....	See Page 37.....	3½ units
6. Science.....	See Page 39.....	1½ units
7. History: c.....	See Page 40.....	1 unit
8. Electives.....	See Page 40.....	3 units

Total 14 units

Six-Year Ph.B.-B.E. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
3. Latin: a, b, c, d.....	See Page 35.....	4 units
4. Modern Languages: a or b...	See Page 36.....	2 units
5. Mathematics: a, b, c, d.....	See Page 37.....	3½ units
6. Physics.....	See Page 39.....	1 unit
7. History: a, b, c.....	See Page 40.....	2 units
8. Physiology.....	See Page 39.....	½ unit
9. Electives.....	See Page 40.....	3 units

Total 19 units

Advanced Standing. Candidates from other colleges must bring letters of honorable dismissal, and upon the presentation of acceptable certificates will be admitted to corresponding standing. Candidates for a degree must enter not later than the beginning of the senior year.

Requirements in Individual Subjects

1. English (3 units)

The books named in the following lists are prescribed for study in English:

Preparation for Part I (1½ units) should aim to give the

power of clear and accurate expression, and a general knowledge of the substance of the books. In an examination the candidate will be called upon to write a paragraph or two on each of several topics, to be chosen from a considerable number — perhaps ten or fifteen — set before him in the examination paper. In every case the ability to write good English will be regarded as more important than knowledge of the books. It is important that the candidate be instructed in the fundamental elements of rhetoric. No candidate will be accepted in English whose work is notably defective in point of spelling, punctuation, grammar, or division into paragraphs.

Preparation for Part II (1½ units) should include a thorough study of each of the works named below, so as to give a knowledge of the subject-matter, form and structure. In addition, the candidate should be well grounded in the essentials of English grammar, and in the leading facts in those periods of English literary history to which the prescribed works belong. For the latter part of the work, Newcomer's Introduction to English Literature and Moody and Lovett's First View of English Literature are recommended.

For students entering in 1913, 1914 and 1915, the books required for reading and study will be as follows:

List 1 for General Reading

At least ten units — each unit is set off by semicolons — are to be selected, two from each group.

Group I

The Old Testament, comprising at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings, and Daniel, together with the books of Ruth and Esther; the Odyssey, with the omission, if desired, of Books I, II, III, IV, V, XV, XVI, XVII; the Iliad, with the omission, if desired, of Books XI, XIII, XIV, XV, XVII, XXI; Virgil's Aeneid. The Odyssey, Iliad, and Aeneid should be read in English translations of recognized literary excellence.

For any unit of the above group a unit from any other group may be submitted.

Group II

Shakespeare's Merchant of Venice, Midsummer Night's Dream, As You Like It, Twelfth Night, Henry the Fifth, Julius Cæsar.

Group III

Defoe's Robinson Crusoe, Part I; Goldsmith's Vicar of Wakefield; either Scott's Ivanhoe or Quentin Durward; Hawthorne's House of the Seven Gables; either Dickens' David Copperfield or Tale of Two Cities; Thackeray's Henry Esmond; Mrs. Gaskell's Cranford; George Eliot's Silas Marner; Stevenson's Treasure Island.

Group IV

Bunyan's Pilgrim's Progress, Part I; The Sir Roger de Coverley Papers in the Spectator; Franklin's Autobiography; Irving's Sketch Book; Macaulay's Essays on Lord Clive and Warren Hastings; Thackeray's English Humourists; Selections from Lincoln, including at least the two Inaugurals, the Speeches in Independence Hall and at Gettysburg, the Last Public Address, and Letter to Horace Greeley, with a brief memoir or estimate; Parkman's Oregon Trail; either Thoreau's Walden, or Huxley's Autobiography and selections from Lay Sermons, including the addresses on Improving Natural Knowledge, A Liberal Education, and A Piece of Chalk; Stevenson's Inland Voyage and Travels with a Donkey.

Group V

Palgrave's Golden Treasury (First Series), Books II and III, with especial attention to Dryden, Collins, Gray, Cowper, and Burns; Gray's Elegy in a Country Churchyard and Goldsmith's Deserted Village; Coleridge's Ancient Mariner and Lowell's Vision of Sir Launfal; Scott's Lady of the Lake; Byron's Childe Harold (Canto IV.), and Prisoner of Chillon; Palgrave's Golden Treasury (First Series), Book IV, with especial attention to Wordsworth, Keats, and Shelley; Poe's Raven, Longfellow's Courtship of Miles Standish, and Whittier's Snow Bound; Macaulay's Lays of Ancient Rome, and Arnold's Sohrab and Rustum; Tennyson's Gareth and Lynette, Lancelot and Elaine, and The Passing of Arthur; Browning's Cavalier Tunes, The Lost Leader,

How They Brought the Good News from Ghent to Aix, Home Thoughts from Abroad, Home Thoughts from the Sea, Incident of the French Camp, Hervé Riel, Pheidippides, My Last Duchess, Up at a Villa—Down in the City.

List 2 for Minute and Critical Study

Shakespeare's *Macbeth*; Milton's *Lycidas*, *L'Allegro*, *Il Penseroso*, and *Comus*; either Burke's *Speech on Conciliation with America*, or both Washington's *Farewell Address* and Webster's *First Bunker Hill Oration*; either Macaulay's *Life of Johnson*, or Carlyle's *Essay on Burns*.

2. Greek (3 units)

a. **Grammar and Composition** (1 unit). The common forms, idioms, and constructions, and the general grammatical principles of Attic Greek prose. Translation into Greek of detached sentences and very easy continuous prose based upon the *Anabasis*.

b. **Xenophon** (1 unit). The first four books of the *Anabasis*.

c. **Homer** (1 unit). The first three books of the *Iliad* (omitting II, 494-end) and the Homeric constructions, forms and prosody.

In connection with the reading in Greek there should be constant practice in sight translation and in prose composition.

3. Latin (4 units)

a. **Grammar and Composition** (1 unit). The inflections; the simpler rules for composition and derivation of words; syntax of cases and the verb; structure of sentences in general, with particular regard to relative and conditional sentences, indirect discourse, and the subjunctive. Translation into easy Latin of detached sentences and very easy continuous prose based upon Caesar and Cicero.

b. **Caesar** (1 unit). Any four books of the *Gallic War*.

c. **Cicero** (1 unit). Any six orations from the following list, or equivalents: The four orations against Catiline, Archias, The Manilian Law, Marcellus, Roscius, Milo, Sestius, Ligarius, the fourteenth Philippic.

d. Vergil (1 unit). The first six books of the Aeneid, and so much prosody as relates to accent, versification in general, and dactylic hexameter.

Equivalents in b, c, or d, will be accepted at the discretion of the head of the department.

Every student is required to use in the college class room the Roman Method of pronunciation, and is expected to have had practice in this method at school.

4. Modern Languages (2 units)

a. German (2 units). Two years' work will be necessary to meet this requirement.

During the first year the work should comprise: 1. careful drill upon pronunciation; 2. the memorizing and frequent repetition of colloquial sentences; 3. drill upon the rudiments of grammar, that is, upon the inflection of the article, of such nouns as belong to the language of every-day life, of adjectives, pronouns, weak verbs, and the more usual strong verbs; also upon the use of the more common prepositions, the simpler uses of the modal auxiliaries, and the elementary rules of syntax and word-order; 4. abundant easy exercises designed not only to fix in mind the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; 5. the reading of from 75 to 150 pages of graduated texts from a reader, with constant practice in translating into German easy variations upon sentences selected from the reading lesson, the teacher giving the English, and in reproducing from memory sentences previously read.

During the second year the work should comprise: 1. the reading of from 150 to 250 pages of literature in the form of stories and plays; 2. accompanying practice, as before, in the translation into German of easy variations upon the matter read and also in the off-hand reproduction, sometimes orally and sometimes in writing, of the substance of short and easy selected passages; 3. continued drill upon the rudiments of the grammar, with constant applications in the construction of sentences.

b. French (2 units). Two years' work will be necessary to meet this requirement.

During the first year the course should include: 1. careful drill in pronunciation; 2. the rudiments of grammar, including the inflection of the regular and the more common irregular verbs, the plural nouns, the inflection of adjectives, participles, and pronouns; the use of personal pronouns, common adverbs, prepositions, and conjunctions; the order of words in the sentence and the elementary rules of syntax; 3. abundant easy exercises, designed not only to fix in the memory the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; 4. the reading of from 100 to 175 duodecimo pages of graduated texts, with constant practice of translating into French easy variations of the sentences read, the teacher giving the English, and in reproducing from memory sentences previously read; 5. writing French from dictation.

During the second year the work should comprise: 1. the reading of from 250 to 400 pages of easy modern prose in the form of stories, plays, or historical or biographical sketches; 2. constant practice, as in the previous year, in translating into French easy variations upon the texts read; 3. frequent abstracts, sometimes oral and sometimes written, or portions of the text already read; 4. writing French from dictation; 5. continued drill upon the rudiments of grammar, with constant application in the construction of sentences; 6. mastery of the forms and use of pronouns, pronominal adjectives, of all but the rare irregular verb forms, and of the simpler uses of the conditional and subjunctive.

5. Mathematics ($2\frac{1}{2}$ units; 3 units; $3\frac{1}{2}$ units)

a. Algebra. ($1\frac{1}{2}$ units). The four fundamental operations for rational algebraic expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions, ratio and proportion; linear equations, both numerical and literal, containing one or more unknown quantities; problems depending on linear equations; radicals, including the extraction of the square root of

polynomials and of numbers; exponents, including the fractional and negative.

Simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations.

Problems depending upon quadratic equations.

The binomial theorem for positive integral exponents.

The formulas for the n th term and the sum of the terms of arithmetic and geometric progressions, with applications.

b. Plane Geometry ($\frac{1}{2}$ unit). The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle.

The solution of numerous original exercises, including loci problems.

Application to the mensuration of lines and plane surfaces.

c. Solid Geometry ($\frac{1}{2}$ unit). The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurement of prisms; pyramids, cylinders, and cones; the sphere and the spherical triangle.

The solution of numerous original exercises, including loci problems.

Applications to the mensuration of surfaces and solids.

d. Plane Trigonometry ($\frac{1}{2}$ unit). Definitions and relations of the six trigonometric functions as ratios; circular measurement of angles.

Proofs of principal formulas, in particular for the sine, cosine, and tangent of the sum and the difference of two angles, of the double angle and the half angle, the product expressions for the sum or the difference of two sines or of two cosines, etc.; the transformation of trigonometric expressions by means of these formulas.

Solution of trigonometric equations of a simple character.

Theory and use of logarithms (without the introduction of work involving infinite series).

The solution of right and oblique triangles, and practical applications.

6. Science (1½ units)

Physics (1 unit). An elementary knowledge of physics, such as may be gained by a year's course of study covering mechanics, sound, heat, light and electricity, as treated in any standard high school text book. Preparation should include individual laboratory work, attested by a note-book, comprising at least thirty-five exercises, chiefly quantitative.

Chemistry (1 unit). An elementary knowledge of chemistry, such as may be gained by the study of at least one standard text book, affording the pupil a comprehensive and connected view of the most important facts and laws. Preparation should include individual laboratory work, comprising at least forty exercises selected from a list of sixty or more, and instruction by lecture-table demonstrations to be used mainly as a basis for questioning upon the general principles involved in the pupil's laboratory investigations.

Physiology (½ unit). A study of the nature of foods and their history in the body; the essential facts of digestion, absorption, circulation, secretion, excretion, and respiration; the motor, nervous, and sensory functions; and the structure of the various organs by which these operations are performed. A note-book with careful outline drawings of the chief structures studied anatomically, together with explanations of these drawings, and the study of a good text-book are essential.

The above-named sciences are preferred. The following will be accepted. The figure in parenthesis shows the unit value:

Biology.	(1)	Botany.	(1)
Zoology.	(1)	Physiography.	(1)

In every instance the work expected is that outlined for the given subject in the reports of the Collge Entrance Examination Board and the Carnegie Foundation, or in the Syllabus of the New York State Education Department.

7. History (1 unit; 2 units)

a. **Greek History** ($\frac{1}{2}$ unit). In this study must be included the geography of ancient Greece.

b. **Roman History** ($\frac{1}{2}$ unit). In this study must be included the geography of the Roman Empire.

c. **History of the United States** (1 unit).

Elementary United States history will be accepted if the candidate presents in addition a year of history not otherwise required.

8. Electives ($\frac{1}{2}$ unit; 3 units; $3\frac{1}{2}$ units)

In completing the requirements for admission to each course a fixed number of elective units in subjects not already taken from other groups must be offered from the list below, or from the list in group six, or from the two lists, as follows:

For admission to the A. B. course..... $\frac{1}{2}$ unit

For admission to the Ph. B. course..... $\frac{1}{2}$ unit

For admission to the B. E. course..... 3 units

For admission to the B. S. course..... $3\frac{1}{2}$ units

The figure in parenthesis after each subject shows the unit value of that subject.

Latin: 1, 2, 3, 4.... (4)	Greek History ($\frac{1}{2}$)
Greek: 1, 2, 3..... (3)	Roman History ($\frac{1}{2}$)
French 3 (1)	English History (1)
German 3 (1)	History of English Literature... ($\frac{1}{2}$)
Spanish 1 (1)	Plane Trigonometry ($\frac{1}{2}$)
Spanish 2 (1)	Spherical Trigonometry..... ($\frac{1}{2}$)
Civics. ($\frac{1}{2}$)	Drawing. (1)

Entrance Examinations in 1913

Entrance examinations will be held at the college in June and in September, in accordance with the schedule given below. A fee of five dollars is required at the time of registration.

Only those who register at the appointed time will be admitted to the examinations of the following days.

Schedule of the June Examinations

Thursday, June 12

9 A. M. Candidates register at the office of the secretary.

Mathematics a. (Algebra complete).....	11 A. M. to	1 P. M.
Science.....	“ “	“

History a-c. (American and ancient).....	2 P. M.	to	4 P. M.
Physics.....	"	"	"
English (Parts I and II).....	3 P. M.	to	5 P. M.

Friday, June 13

Latin.....	9 A. M.	to	11 A. M.
Mathematics c. (Solid Geometry).....	"	"	"
German (intermediate).....	11 A. M.	to	1 P. M.
French (intermediate).....	"	"	"
Greek.....	2 P. M.	to	4 P. M.
Mathematics b. (Plane Geometry).....	"	"	"
Mathematics d. (Plane Trigonometry).....	"	"	"

Schedule of the September Examinations*Monday, September 15*

9 A. M. Candidates register at the office of the secretary.

Tuesday, September 16

Physics.....	9 A. M.	to	11 A. M.
History a-c. (American and ancient).....	"	"	"
Science.....	"	"	"
Mathematics a. (Algebra complete).....	11 A. M.	to	1 P. M.
Mathematics b. (Plane Geometry).....	2 P. M.	to	4 P. M.
Mathematics d. (Plane Trigonometry).....	"	"	"

Wednesday, September 17

Latin.....	9 A. M.	to	11 A. M.
Mathematics c. (Solid Geometry).....	"	"	"
German (intermediate).....	11 A. M.	to	1 P. M.
French (intermediate).....	"	"	"
Greek.....	2 P. M.	to	4 P. M.
English (Parts I and II).....	3 P. M.	to	5 P. M.

DEPARTMENTS OF INSTRUCTION

The Greek Language and Literature

PROFESSOR BENNETT AND MR. MAXON

In course A, leading to the degree of Bachelor of Arts, Greek is required during the freshman and sophomore years, and may be elected during the junior and senior years; in course B, leading to the degree of Bachelor of Arts, Greek is begun on entrance and required for four years. The courses in Greek for the year 1912-13 are as follows:

1. **Greek Grammar.** **Xenophon:** The Memorabilia. **Plato:** The Apology, the Crito, and parts of the Phaedo. **Aristophanes:** The Clouds. **Greek History.**

Required of freshmen in course A. Four hours weekly throughout the year.

2. **The Elements of Greek.**

Required of freshmen in course B. Four hours weekly throughout the year.

3. **Demosthenes:** The Orations against Philip and the Oration on the Crown. **Plutarch:** The Life of Demosthenes. **Archaeology.**

Required of sophomores in course A. Three hours weekly throughout the year.

4. **Xenophon:** The Anabasis. **Composition.** **Greek History.**

Required of sophomores in course B. Three hours weekly throughout the year.

5. **Demosthenes:** The Orations against Philip. **Theocritus.** **Archaeology.**

Elective for juniors in course A. Two hours weekly throughout the year.

6. **Xenophon:** The Memorabilia. **Plato:** The Apology, the Crito, and parts of the Phaedo. **Archaeology.**

Required of juniors in course B. Two hours weekly throughout the year.

7. Herodotus. Archaeology.

Elective for seniors in course A. Two hours weekly throughout the year.

8. Euripides: The Medea. Homer: Selected books of the Iliad and the Odyssey. Archaeology.

Required of seniors in course B. Two hours weekly throughout the year.

9. Honors: Honors in Greek are awarded in course A. Candidates are required to take all the work offered in the course, to maintain a general average of ninety per cent in that work, to meet for two additional hours a week during the first two terms of the senior year for the study of a Greek text, and to write theses on assigned subjects.

Note: At the beginning of the next college year (1913-1914) the following changes in the requirements in Greek for candidates for the degree of Bachelor of Arts and in courses of instruction in Greek will be in effect: 1. Course B leading to the degree of Bachelor of Arts will be abandoned except for candidates previously entered. 2. Students in the course leading to the degree of Bachelor of Philosophy in the class of 1917 and following classes may, if proficient in Latin, elect at the end of the sophomore year to be candidates for the degree of Bachelor of Arts. They must then begin the study of Greek and continue it for five hours weekly during their junior and senior years. 3. The sophomore requirement in Greek will be for four hours weekly instead of three. 4. Junior and senior elective courses will be for three hours weekly instead of two. 5. A special course of three hours weekly throughout the senior year, to be taken in addition to the regular senior elective, will be required of candidates for special honors in Greek.

The Latin Language and Literature

PROFESSOR KELLOGG

The studies of this department are required, in the freshman and sophomore years, of all students who are candidates for either one of the two degrees, A. B. and Ph. B. In the junior and senior years Latin becomes an elective study, except for students who are candidates for honors in Latin; of them it is required.

1. **Livy:** Selections from Books I, XXI and XXII. Roman history. **Tacitus:** Agricola and Germania. **Cicero:** De Senectute or De Amicitia or De Officiis (Book I). Latin composition.

The work of the first year includes a thorough review of forms and syntax through oral and written prose composition and sight reading. Selections from the three great masters of Roman prose are made the basis for grammatical and literary analysis and interpretation, and also, through lectures and assigned reading, for the study of Roman history through the reign of Trajan.

Required of freshmen in the A. B. and Ph. B. courses. Four hours weekly throughout the year.

2. **Terence:** Adelphoe. **Plautus:** Menaechmi or an equivalent. **Horace:** Selected Odes and Epodes. **Catullus:** Selected poems.

Through lectures on ancient comedy and lyric, and by collateral reading, the student is made acquainted with the history of Roman literature under the Republic. The grammatical analysis aims to make familiar the chief characteristics of early and colloquial Latin, and the general economy of poetic diction; the literary interpretation centers chiefly around the influence of Greek life and thought on Roman literature, and the national and personal elements in Latin poetry.

Required of sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. **Horace** (Satires and Epistles) and **Juvenal**. **Pliny the Younger** or **Cicero** (Letters).

This course, through lectures and assigned reading, continues the history of Roman literature under the Empire. A brief introduction to Roman archaeology (with special study of the Forum Romanum) will be given, and in connection with the Pliny an outline of the private life of the Romans.

Elective for juniors in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

4. **Lucretius:** Books III and V and Selections, with lectures on didactic poetry, the atomic theory, and the philosophic system of Epicurus. The literature of the Empire will be illustrated by readings from **Seneca** (Moral Epistles) or **Quintilian** (Book X

on literary criticism) or **Suetonius** (Lives of Julius Caesar and Augustus) or **Martial** (Selected Epigrams).

As this course is not only for those who elect to study Roman life and literature but also for those who may desire to use Latin in teaching or as an instrument in later research work, special assignments are given from authors or inscriptions for practice in editing, or the writing of history from the sources.

Elective for seniors in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

5. Roman Law. When a sufficient number of seniors electing course 4 desire it, the second and third terms in course 4 will be devoted to an Introduction to Roman Law, based on the Institutes of Justinian and Robinson's Selections from Roman Law.

In general, subsidiary reading will be recommended. Equivalents may be substituted in the elective programme at any time, and the order of the subjects as given above may be altered in any one of the four years at the discretion of the head of the department.

6. Honor Course (Omitted in 1913-1914). Studies in the life and works of **Vergil**. Open to seniors who have complied with the requirements for special honors. Three hours weekly throughout the year.

Modern Languages

PROFESSOR BARNES, ADJUNCT PROFESSOR MARCH

ASSISTANT PROFESSOR STEWART AND MR. HASTING

These courses have a twofold object, to give the student such control of the language that he may be able to use it as an instrument in study and research, and to open to him another path to general training and culture. They aim to enable him to read modern texts without translation and to give him some facility in the independent use of the language. In the academic courses the literary side of the study is made prominent; in the engineering division emphasis is laid on those phases of the language which are peculiar to technical and scientific writing. From the beginning the language studied is made so far as possible the language of the class room.

German

1. **Elementary I.** Grammar and reading; drill on inflection and the more usual constructions, with special attention to pronunciation and vocabulary. Bierwirth's Beginning German is used, and portions of Huss's German Reader and Gore's German Science Reader are read, with such other selections as are adapted to the progress of the class.

Required in the B. E. course of freshmen who offer French at entrance. Three hours weekly throughout the year.

1a. **Intermediate I.** Grammar for review and reference; exercises in syntax; practice in writing German. The reading of the class is mainly in Scientific German, but other matter is also read and suitable selections are assigned for outside study and made the basis of tests and themes. In any year the equivalent of at least two of the following scientific works and one of the others will be read:

Wallentin: Grundzüge der Naturlehre

Du Bois-Reymond: Wissenschaftliche Vorträge

Lassar-Cohn: Die Chemie im täglichen Leben

Muller: Die elektrischen Maschinen

Hauff: Lichtenstein; Freytag: Das Nest der Zaunkönige, Soll und Haben; Sudermann: Frau Sorge; Storm: Der Schimmelreiter; Meyer: Das Amulett, Der Heilige.

Required in the B. E. course of freshmen who offer German for entrance. Three hours weekly throughout the year.

1b. **Intermediate III.** First term: (a) Grammar for review and reference, with exercises and drill on syntax; Thomas's Practical German Grammar. (b) Written composition and reproduction, with colloquial practice and work in vocabulary building based on Bernhardt's German Composition. Second and third term: Reading and discussion of works selected from the classics, from nineteenth century drama and fiction, and from historical writings. In 1913-14 one or more works from each of at least four of the following groups will be read:

Lessing: Minna von Barnhelm, Emilia Galotti

Goethe: Götz von Berlichingen, Egmont

Schiller: Maria Stuart, Die Jungfrau von Orleans

Freytag: *Die Journalisten*; Moser: *Der Bibliothekar*; Ernst: *Flachsmann als Erzieher*.

Chamisso: *Peter Schlemihl*; Ludwig: *Zwischen Himmel und Erde*; Hauff: *Lichtenstein*; Freytag: *Soll und Haben*; with others to be assigned for outside reading.

Sybel: *Die Erhebung Europas gegen Napoleon*; Ranke: *Kaiserwahl Karls des V*; Freytag: *Bilder aus der deutschen Vergangenheit* (selections); Schiller: *Egmonts Leben und Tod*.

Required in the Ph. B. and B. S. courses of freshmen who offer German for entrance. Elective in the A. B. course for juniors who have had two years of German before entrance. Five hours weekly throughout the year.

Sophomores who offer French for entrance but have also had two years of German take this course in place of German 2.

2. Elementary II. A course in grammar, composition and reading; easy selections in prose and poetry, historical matter, a novel and a play are read; while thorough preparation and careful drill are insisted upon throughout, the amount of reading demanded is considerable. Bierwirth's *Beginning German* and Hewett's *German Reader* are used.

Required in the Ph. B. and B. S. courses of sophomores who offer French at entrance. Elective for juniors in the A. B. course. Five hours weekly throughout the year.

3. Intermediate II. First term: (a) Grammar reviewed and continued, with chief attention to the derivation and composition of the several parts of speech, case and verb construction, idioms, and the translation of English into German; Joynes-Meissner *German Grammar* and Pope's *German Composition*. (b) Reading and vocabulary study based on Meyer-Försters *Karl Heinrich*. Second and third terms: Rapid reading of one or more works from each of the following groups:

Schiller: *Wilhelm Tell*, *Historische Skizzen*

Goethe: *Götz von Berlichingen*, *Hermann und Dorothea*

Sudermann: *Frau Sorge*, *Der Katzensteg*

Elective in the Ph. B. and B. S. courses for juniors who have passed German 2 with a grade of 80 or more, or German 1b

with a grade between 70 and 85. Three hours weekly throughout the year.

3a. Advanced II. Course (a) below and one of the others, or parts of two or more of them:

a) Advanced composition (Lange), with short independent essays; studies in words and their uses (Hastings), with some drill on derivations and etymology; journalistic German (Pohn), with sight readings from current newspapers and periodicals.

b) A study of some of the more recent prose literature, especially the novel; works of Storm, Keller, Meyer, Sudermann, and others.

c) A continuation of the classics begun in German 1b; reading and discussion of additional works of Lessing, Schiller and Goethe; Biedermanns, *Deutsche Bildungszustände im 18. Jahrhundert*.

d) An intensive study of Schiller's life and works.

e) A course of reading in nineteenth century drama, with special attention to Kleist, Hebbel, Grillparzer and Hauptmann.

Elective in the Ph. B. and B. S. courses for juniors who have passed German 1b with a grade of 85 or more. Three hours weekly throughout the year.

4. Advanced I. Language and literature.

a) Advanced composition, with independent themes based on the reading of course (c) below.

b) Kochs *Geschichte der deutschen Literatur* as a handbook, with lectures, and references to other works.

c) A study of the classical period; Lessing, Goethe and Schiller are discussed in this order and chief attention is given to the following works:

Lessing: *Emilia Galotti*, *Nathan der Weise*

Goethe: *Faust I* (with lectures on the Faust legend)

Schiller: *Maria Stuart*, *Jungfrau von Orleans*, *Wallenstein* (with this are read selections from *Der 30 jährige Krieg*)

Elective in the Ph. B. and B. S. courses for seniors who have passed German 3 with a grade of 80 or German 3a with a grade between 70 and 85. Three hours weekly throughout the year.

4a. Advanced III. Course (a) below and one of the others, or parts of two or more of them.

a) Advanced composition (Lange, continued), with original themes on subjects connected with the reading of the course.

b) A study of Goethe's life and works, with readings from *Dichtung und Wahrheit*, and the poems; Egmont (with this is read Schiller's Egmonts Leben and Tod), *Iphigenie auf Tauris*, Torquato Tasso; Faust I, with readings on the Faust legend in literature.

c) A history of German literature, based on Kluges *Geschichte der deutschen National-Literatur*, with assigned studies and parallel readings from an anthology.

d) A course in Middle High German, based on Wright's *Middle High German Primer* as a text book, with supplementary exercises from other sources. This is a one-term course and may in any year be given as a part of the first half-year's work of (c) above.

Elective in the Ph. B. and B. S. courses for seniors who have passed German 3a with a grade of 85 or more. Three hours weekly throughout the year.

French

1. Elementary I. A beginner's course in grammar and reading with special attention to pronunciation, vocabulary, and the common forms and idioms. Aldrich and Foster's *Elementary French* and Super's *Reader* are used, with such other reading as may be suited to the class.

Required in the B. E. course of freshmen who offer German at entrance. Three hours weekly throughout the year.

1a. Intermediate I. This course consists of (a) a rapid review of the elements of grammar, and the study of syntax and composition (Koren's *French Composition* and Armstrong's *French Verb*); (b) Practice in pronouncing and reading French, by means of reading, dictation, and some conversation; (c) Careful translation. In 1913-14 the books read will be:

Daudet: *Tartarin de Tarascon* (Siepmann)

French Short Stories (Buffum) and one or more of the following:

Dumas: *La Tulipe Noire*; Feuillet: *Le Roman d'un Jeune Homme Pauvre*; Hugo: *Hernani*; La Brète: *Mon Oncle et mon Curé*; Labiche et Delacour: *La Cagnotte*; Sand: *La Petite Fadette*.

Required in the B. E. course of freshmen who offer French for entrance. Three hours weekly throughout the year.

1b. Intermediate III. This course is like 1a, but includes a wider range of reading, so as to give a general view of the history of French literature. Among the additional books that are read may be:

Corneille: *Le Cid*; Molière: *l'Avare*; Racine: *Athalie*; Bossuet: *Selections*; Le Sage: *Gil Blas*; Beaumarchais: *Le Barbier de Seville*; and selections from *La Lyre Française* (Masson) and Lanson's *Histoire de la Littérature Française*.

Required in the Ph. B. and B. S. course of freshmen who offer French for entrance. Elective in the A. B. course of juniors who have had two years of French before entrance. Five hours weekly throughout the year.

Sophomores who offer German for entrance but have also had two years of French take this course in place of French 2.

2. Elementary II. A beginner's course in grammar and reading. This course is similar to French 1, but includes more work in composition and reading. Aldrich and Foster's *Elementary French* and Comfort's *Prose Composition* are used. The reading may include:

Halevy: *L'Abbé Constantin*; Sand: *La Mare au Diable*; La Biche et Martin: *Le Voyage de M. Perrichon*.

Required in the Ph. B. and B. S. course of sophomores who offer French at entrance. Elective for juniors in the A. B. course. Five hours weekly throughout the year.

3. Intermediate II. Grammar reviewed; exercises in vocabulary, idioms and the spoken French in connection with Daudet's *Tartarin de Tarascon* (Siepmann). This work is followed by composition and reading. Koren's *French Composition* is used. The books read may be:

Zola: *la Débâcle*; Souvestre: *Un Philosophe sous les Toits*; De Musset: *selections*.

Elective in the Ph. B. and B. S. courses for juniors who have passed French 2 satisfactorily, or French 1b with a grade of not less than 80. Three hours weekly throughout the year.

3a. Advanced II. A reading course in nineteenth century literature. Lanson's *Histoire de la Litterature Française* is followed and discussed, and a considerable amount of modern French is read out of class and reported upon. The college library is called into use, and the student should gain some real acquaintance with certain of the modern authors. One hour a week is given to advanced composition, including translations and the writing of themes.

Elective in the Ph. B. and B. S. courses for juniors who have passed French 1b with a grade of 85 or more. Three hours weekly throughout the year.

4. Advanced I. This course is devoted to the study of some of the classics of the seventeenth century. Selected works of Corneille, Racine, Molière, La Fontaine, and Bossuet are read, together with parts of Lanson's *Histoire de la Litterature Française*. One hour a week is devoted to syntax and composition. Armstrong's French Verb is used.

Elective in the Ph. B. and B. S. courses for seniors who have passed French 3. Three hours weekly throughout the year.

4a. Advanced III. This course is devoted to the study of Molière, his life, his works, and his age.

Elective in the Ph. B. and B. S. courses for seniors who have passed French 3a satisfactorily. Three hours weekly throughout the year.

Spanish

1. Junior Elective. Grammar and reader; practice and sight translation. Selections from *Gil Blas*, a recent novel and a modern play are read.

Open to juniors in the A. B., Ph. B. and B. S. courses and to seniors in those courses who have not had Spanish in junior year. Three hours weekly throughout the year. Not given in 1912-13.

2. Senior Elective. Grammar and composition. One or two

dramas of the classical period and one or two modern plays are read, together with some works of recent fiction.

Open to seniors in the A. B., Ph. B. and B. S. courses who have had Spanish I. Two hours weekly throughout the year. Not given in 1913-14.

The English Language and Literature

PROFESSOR HALE AND ASSISTANT PROFESSOR CHASE

Courses 1, 2, and 3 are required courses as noted. The advanced courses are arranged so as to form the following three electives, each of which is a connected course of study lasting through junior and senior years:

a) The General Elective (comprising courses 4 and 7). This elective is recommended to those students who are not doing special work in the department.

b) The Major Elective (comprising courses 5 and 8).

c) The Special Honor Elective (comprising courses 6 and 9).

A student taking English as a major must take (a) and (b). A student working for special honors must take (c) and either (a) or (b). For any student, however, who wishes both to take English as a major and to work for special honors, an arrangement will be made by which only two courses each year will be required.

1. **Rhetoric and Composition.** The aim of this course is to train the student in the use of clear and correct English, written and spoken. The work will consist of the study of rhetorical principles and practice in composition. In 1912-13 Scott and Denney's *New Composition Rhetoric* and Woolley's *Handbook of Composition* will be used as text-books. A certain amount of outside reading from English authors will also be assigned. Usually, two short themes a week will be required, and at intervals of six weeks longer themes. Each student will meet the instructor in personal conferences for advice about his individual work.

Required of freshmen in all courses. Three hours weekly throughout the year in the A. B., Ph. B. and B. S. courses; two hours weekly throughout the year in the B. E. course.

2. **Essays.** The practice of English composition will be carried on throughout the course. As a rule two essays a term will be written, which will be corrected and criticised in individual conferences with the instructor.

Required of sophomores, juniors and seniors in all courses. The requirement for senior engineers includes but one literary essay.

3. **Introduction to English Literature.** This course has two objects: An intimate acquaintance with a few masterpieces of English literature, and a knowledge of the historical development of the literature. Moody and Lovett's *History of English Literature* is used as a text-book. The books selected for special study in 1912-13 include, in the fall term, *Béowulf*, Chaucer's Prologue and The Nun's Priest's Tale, More's *Utopia*, Everyman, Marlowe's *Dr. Faustus*, and other pre-Shakespearean plays; in the winter term, Shakespeare's *Henry IV*, (Part I), *Hamlet*, and *The Tempest*; in the spring term, a selection from the poems of Pope and Wordsworth, and Arnold's *Culture and Anarchy*. The aims of this work are to train the student in the habit of careful reading; to help him to recognize in each work studied the peculiar merit; and, through the writing of reports or essays, to develop his analytical ability and his power of expression.

Required of sophomores in all courses. Three hours weekly throughout the year in the A. B., Ph. B. and B. S. courses; two hours weekly throughout the year in the B. S. course.

4. **Modern English Literature.** The object of this course is a general study of literature, based on the more important literary forms. The novel, tragedy, and lyric poetry are studied in fall, winter, and spring terms respectively. The study of the novel deals with the work of the chief English and American novelists of the nineteenth century. The special works selected for the winter term are the more important tragedies of Shakespeare. The work of the spring term gives an introduction to the critical study of poetry, Page's *British Poets of the Nineteenth Century* being used as a text-book.

Elective for juniors in all courses. Three hours weekly throughout the year.

5. **Early English Literature.** During the first two terms *The Canterbury Tales* are read and as much of Chaucer's other work as time permits. There is a certain amount of linguistic study, which is necessary for an intelligent reading of the text; but the end in view is an understanding of Chaucer's literary skill and his relations to the age in which he lived. In the spring term the work is in simple Anglo-Saxon prose, such as may be found in *Bright's Reader*.

Elective for juniors in all courses. Three hours weekly throughout the year.

6. **A History of Criticism.** This course is designed to acquaint the student with the comparative method in the study of literature. The main influences affecting English critical thought in successive periods is pointed out, and the development is traced by means of extended reading in the critical documents themselves. A part of the year is devoted to some more limited topic, such as *The Transmission from the Neo-Classical to the Romantic School in England*. Each student is required to write an essay of considerable length on a special topic suggested by the course.

Elective for juniors in all courses. Three hours weekly throughout the year.

7. **Modern English Literature.** In the first term the short story as developed in America from the time of Irving is the subject of study. The rest of the work follows closely the plan of course 4, of which this course is a continuation. In the winter the comedies of Shakespeare are studied, and in the spring term *Page's British Poets of the Nineteenth Century* is used, as before.

Elective for seniors in all courses. Three hours weekly throughout the year.

8. **Old English and Historical Grammar.** *Béowulf* is read in the fall term. The rest of the year is devoted to the history of the English language, with especial attention to the phonology

and the relations of Old and Modern English to the other Teutonic languages, the general principles of phonetics and spelling, word formation including inflections, vocabulary including changes of meaning, and syntax.

Elective for seniors who have taken course 5. Three hours weekly throughout the year.

9. The Critical Positions of To-day. This course is a continuation of course 6. It deals more particularly with the schools of criticism of the nineteenth century and with the chief developments in their critical ideas in the literary world to-day. The object of the course, however, is to give a way of looking at literature rather than a knowledge of the history of criticism. The essay written in the course is some original study of an author that may illustrate principles dealt with in the course.

Elective for seniors who have taken course 6. Three hours weekly throughout the year.

Rhetoric and Public Speaking

PROFESSOR MCKEAN

10. Sophomore Orations. The work consists of three distinct parts: viz., (a) the writing of orations under individual criticism; (b) the special preparation of the same for oral presentation, under individual criticism based upon the general principles of public speaking and upon the personal needs of the student; and (c) the delivery of these orations before the class, subject to still further criticism for general instruction.

Required of sophomores in the B. E. course. One hour weekly throughout the year.

11. Junior Orations. The work is ilke that of course 10, but of an advanced character.

Required of juniors in all courses. One hour weekly throughout the year.

12. Senior Orations. The work is like that of course 10, but of a more advanced character.

Required of seniors in the A. B., Ph. B. and B. S. courses. One hour weekly throughout the year.

13. Argumentation and Debate. The work consists of two distinct parts: viz., (a) the study of the theory of argumentation and debate, pursued by means of recitations, criticisms, discussions and informal lectures, based upon a text-book; and (b) considerable practice in the analysis of subjects for debates, in the preparation of briefs and arguments, and in the more formal debates of the class room—all subject to criticism and discussion.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

14. Advanced Argumentation and Debate. The work is of a more advanced character than that in course 13, and consists principally of class-room debates throughout the year formally conducted and subject to criticism and discussion.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have completed course 13. Two hours weekly throughout the year.

History and Government

PROFESSOR RIPTON

The work of the department covers three years, beginning with the first term of the sophomore year. The instruction is given by text-book, by lectures, and by library references.

1. Medieval and Modern History. The course begins with a brief study of the Roman Empire and the contribution of the ancient world to modern civilization. Attention is given to events which have had permanent influence upon the historical development of Europe, and to institutions of enduring importance; among these may be named the medieval church, the feudal institutions, the French monarchy, and the English constitution. The course is designed to form a foundation of historical knowledge which may serve as a preparation for any further study, and to give to the student some acquaintance with methods of historical study and the use of authorities and sources.

Required of sophomores in the A. B., Ph. B. and B. S. courses, and of juniors in the B. E. course, Option B. Four hours weekly throughout the year. In 1913-14, two hours weekly.

2. **American History.** A study is made of the period of American discovery and exploration and of the colonial period. The main part of the work, however, begins with an examination of the causes of the American Revolution. The course is guided by text-books and lectures, and much work is done in the library among the sources and authorities.

Elective for juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Required of juniors in the B. E. courses. Two hours weekly throughout the year.

3. **French Revolution and Nineteenth Century.** This course considers the causes, ideas and progress of the French Revolution and the reconstruction of European politics and society produced by the revolutionary and Napoleonic wars. Attention is then directed to the development of the spirit of nationality, especially in Italy and Germany, and a careful study is made of the political, economic and social progress of Great Britain and the continental states. The course is designed to give a clear understanding of conditions in Europe to-day and the historical processes by which they were brought about.

Elective for juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

4. **Comparative Politics.** A comparative study is made of the constitutions and governments of England, the United States, and the principal nations of continental Europe. Sufficient attention is given to historical origins to account for characteristic differences, but the work consists mainly of a systematic study of the constitutions, their adoption and methods of amendment, the distribution of governmental powers, and their practical operation, including some account of political parties. The course concludes with a study of the principles of International Law.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Required of Seniors in the B. E. course, Option B. Three hours weekly throughout the year.

5. **Honors.** A course in the Constitutional History of England is offered to candidates for special honors in history. Senior year, three hours weekly.

Philosophy

PROFESSOR HOFFMAN

The courses in this department begin with the first term of the junior year and extend through the entire senior year. Logic, elementary psychology and elementary ethics come in the junior year. The more advanced courses, with special studies in philosophy, are taken up in the senior year. Instruction in the various studies of the department is usually given by means of lectures, discussions, and the use of a text-book.

1. **Logic.** This study is confined to the simple elements of the science. As soon as the rules of correct thinking are mastered, the student is put at once to the analysis of arguments, the chief purpose of the study being to develop skill in detecting fallacies. Extracts from many authors are brought before the class for criticism, and so far as possible they are taken from every field of thought.

Elective for juniors, in the A. B., Ph. B. and B. S. courses; required of seniors in the B. E. course, electrical division. Three hours weekly during the first term.

2. **Elementary Psychology.** This course is designed to acquaint the student with the most obvious facts of his mental experience; and the attempt is made to classify these facts into a system. The relation of psychology to the other sciences is set forth, and the importance of the study is emphasized in that it lays the foundation for all the sciences of man as a political, moral and religious being.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term.

3. **Elementary Ethics.** Only the outlines of the subject are presented in this course. The ordinary duties of man are pointed out by first describing those concerning himself and those that arise from his relation to others, to nature, and to God.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. **Advanced Psychology.** The chief problems discussed in

this course are the recent views concerning the nature of perception, the localization of functions and the theories concerning memory, conception, the emotions and the will. The facts of abnormal psychology are also here considered, especially insanity, dreams, hypnotism, telepathy, and the hypothesis of a secondary self.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during first term.

5. Advanced Ethics. Some account of the history of ethics is given in this course, and present ethical theories are stated and discussed. The relation of ethics to other sciences is emphasized and much attention is given to the ethical problems involved in such questions as education, taxation, transportation, corporations, the treatment of criminals, the care of the poor, and the formation and dissolution of the family.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during second term.

6. Evolution of Religion. The object of this course is to show how religion originates and to trace out the steps taken in its development. The chief ideas of the leading religions of the heathen world are critically examined, their excellencies and defects are pointed out, and a comparison of them is made with the special doctrines of the Christian system.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

7. History of Philosophy. The attempt is made in this course to go over with considerable detail the general field of philosophy from the earliest times down to the present day. In this way the views of the principal thinkers of the world are presented and discussed upon a great variety of problems, such as the validity of knowledge, the nature of virtue, the foundations of the State and the existence of God. Much is made in this course of the historical connection of the different systems for the purpose of impressing upon the mind of the student the successive steps that have been taken in the actual development of thought.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Economics and Sociology

PROFESSOR KENNEDY

1. **Elements of Economics.** General economic theory is studied; special attention is given to the theory of distribution and its relation to economic problems.

Required of seniors in the B. E. course, option B. Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first and second terms. Prerequisite course: History 1.

2. **Elements of Economics.** This course is designed to give a brief study of the general principles of economics and an application of these principles to practical economic problems.

Required of seniors in the B. E. course: G. E., Option A. and E. E. Three hours weekly during the first term.

3. **Financial History of the United States.** The financial history of the United States is studied from the organization of our national system in 1789 to the present time. Some of the subjects covered are: the Revolutionary and other war debts; the United States Banks; the Independent Treasury; Civil war financing; the National Banking System; the Government Revenue System; the Tariff; the National Debt.

Required of seniors in the B. E. course, Option B. Elective for juniors in the A. B., Ph. B., and B. S. courses. Three hours weekly during the third term. Prerequisite course: Economics 1.

4. **Public Finance.** This course covers the theory of public finance.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first term and one-half of the second. Prerequisite courses: Economics 1 and 3.

5. **Money and Banking.** This course outlines briefly the problems concerning money and banking.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second half of the second term and during the third term. Prerequisite courses: Economics 1, 3 and 4.

6. The Principles of Sociology. A study of the origin, growth, structure, and activities of society, with a view of acquiring a systematic description and explanation of social phenomena as a whole.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly during the first term.

7. Charities and Corrections. Cause of degeneracy, treatment of dependents and delinquents. Particular attention is given to causes of poverty and crime, the method of treatment, and the responsibility of the community.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly during the second and third terms. Follows course 6.

8. Honors. Special honors in Economics are offered to seniors, in the A. B., Ph. B. and B. S. courses, who are qualified to pursue them.

Mathematics

PROFESSOR GARIS AND MR. MAXON

Mathematics is required in the A. B. and Ph. B. courses during the freshman year and is elective during the sophomore, junior and senior years. In the B. S. course mathematics is required during the freshman and sophomore years and is elective during the junior and senior years. The object of the instruction in these courses is to train the student to clear and exact thinking and to provide him with a knowledge of mathematics broad enough to enable him to give instruction in preparatory schools or to pursue his studies further to good advantage.

The following courses are given:

1. Solid Geometry.

Required of freshmen in the A. B. and Ph. B. courses during the first term. Four hours weekly.

2. Higher Algebra.

Required of freshmen in the A. B. and Ph. B. courses during the second term. Four hours weekly.

2a. Higher Algebra.

Required of freshmen in the B. S. course during the first term. Five hours weekly.

3. Trigonometry.

Required of freshmen in the A. B. and Ph. B. courses during the third term. Four hours weekly.

3a. Trigonometry.

Required of freshmen in the B. S. course during a part of the second term. Five hours weekly.

4. Analytic Geometry.

Required of freshmen in the B. S. course during a part of the second term and during the third term. Five hours weekly.

4a. Analytic Geometry.

Optional for sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

5. Differential and Integral Calculus.

Required of sophomores in the B. S. course and elective for juniors in the A. B. and Ph. B. courses who have had 4a. Three hours weekly throughout the year.

6. Advanced Calculus.

Elective for juniors in the B. S. course and for seniors in the A. B. and Ph. B. courses who have had 5. Three hours weekly throughout the year.

7. Differential Equations.

Elective for seniors in the B. S. course who have had 6. Three hours weekly throughout the year.

8. Honors. Candidates will be given advanced work in various subjects suited to their special ability.

Open to seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

Mechanics and Physics

PROFESSOR OPDYKE

For students in the A. B., Ph. B. and B. S. courses, the work in mechanics and physics is elective and may be continued through the junior and senior years. A course in general physics, consisting of lectures and recitations, is accompanied or followed by one in laboratory work. The student may then take a course in mathematical physics, including one term of general astronomy; and this may be supplemented by a course leading to special honors.

For students in the B. E. course, the work in physics is required throughout the sophomore year; but a B. E. student, upon special vote of the faculty and in case his schedule of hours allows it, may elect physics as an extra subject during his junior and senior years. See courses 3, 4 and 5.

The collection of apparatus for the illustration of lectures is extensive. It has been secured largely from foreign makers and includes sets of standard pattern by Koenig, Duboscq, Ruhmkorff and others.

The courses in greater detail are as follows:

1. **General Physics.** This course is intended to give a general presentation of the facts and laws of physics. Experimental lectures, recitations and discussions aim to make the student familiar with the chief phenomena of the subject and their explanation.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

2. **Laboratory Work.** This course is open to those who are taking physics 1 or who have taken it and who have taken mathematics 4 or 4a, and consists of individual work by the students themselves in the laboratory, supplemented by lectures on some of the mathematical aspects of the subject omitted in 1. The experiments performed are such as allow accurate measurement of the quantities involved; and the results obtained are used to verify some general law, or to obtain some physical constant of nature.

Elective for juniors and seniors in the A. B., Ph. B. and B. S. courses. Two laboratory periods and one lecture period weekly throughout the year.

1a. General Physics for Engineers. This course treats the subject more mathematically than 1, and is given to students in the engineering course. The calculus is used, more especially during the second and third terms. Assuming some knowledge of the fundamental facts of physics, attention is paid to the discussion of the phenomena and their mathematical analysis, in so far as this is possible with the use of the more elementary analytical methods. The work consists of lectures, recitations and laboratory practice.

Required of sophomores in the B. E. course. Two, three and three classroom hours a week during the first, second and third terms, respectively; and one laboratory period a week throughout the year.

3. Mathematical Physics. This course is open to those who have taken physics 2 and mathematics 5, and aims to carry out and complete the mathematical discussion of some parts of the subject. A good knowledge of calculus is required, and an elementary knowledge of differential equations. Some time is devoted to a further study of differential equations as applied to physical problems, and through lectures and assignments of reading the student is introduced to more advanced work.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have taken 2 and open to juniors and seniors in the B. E. course, upon special vote of the faculty. Three hours a week during the first and second terms. This course and course 4 are intended to be elected together.

4. Spherical Trigonometry and Astronomy. A short course in astronomy is given, beginning with the study of spherical trigonometry. The course is general in character, including some reference to the simpler mechanical aspects of the subject.

Elective for seniors who have taken 3; required of juniors in the general engineering course, Option A, and in the sanitary engineering course; and open to other engineering students of

the junior and senior classes, upon special vote of the faculty. Three hours a week during the third term.

5. Honors. Candidates for special honors in physics must complete all the regular work of the department and must pursue, in addition, a special course in advanced mechanics and physics three hours a week throughout the senior year, and must submit theses.

Chemistry

PROFESSOR ELLERY AND MR. SALATHE

The object of instruction in this department is to develop power of accurate observation and logical reasoning, and habits of careful work. Students who are planning special courses in chemistry, medicine, biology, geology, or other branches of natural science, will find the courses of great value. The laboratory facilities are convenient, the apparatus and chemicals are the best, and the chemical library contains recent books on various branches of the science.

1. General Chemistry. The course includes an exhaustive study of the non-metals and their compounds, together with the fundamental laws and theories of chemistry, a special study of the common metals, and a brief introduction to organic chemistry. Laboratory practice in the fall and winter terms is strictly quantitative, and in the spring term includes simpler methods of qualitative analysis involving the recognition of single metals and acid radicals in solution.

Required of sophomores in the B. E. course. Two recitations and one laboratory period weekly during the fall term; three recitations and one laboratory period weekly during the winter and spring terms.

1a. General Chemistry. This course is similar to course 1, in that it includes the study of metals and non-metals, theories and laws, but analytical work in the laboratory is limited to recognition of acid radicals in solution.

Required of freshmen in the B. S. course. Elective for juniors and seniors in the A. B. and Ph. B. courses. Two recitations and one laboratory period weekly throughout the year.

2. Descriptive Chemistry. This course covers a more exhaustive study of the metals than course 1, and acquaints the student with some of the applications of chemistry to engineering problems. The laboratory work comprises systematic examination of complex mixtures, particularly of those materials which are of especial interest to engineers.

Required of juniors in the B. E. course. Two recitations and two laboratory periods weekly during the fall term.

2a. Qualitative Analysis. A study of the reactions of bases and acids in solution, a course in blowpipe analysis, a systematic examination of complex solutions of metals and acids, and of complex solids.

Optional for sophomores in the B. S. course. Elective for seniors in the A. B. and Ph. B. courses, who have had course 1a. Three laboratory periods weekly throughout the year.

3. Quantitative Analysis. In this course the student becomes familiar with various gravimetric and volumetric methods of analysis.

Elective for juniors in the B. S. course who have had course 2a. Three hours weekly throughout the year.

Students who elect Quantitative Analysis will be expected to elect Course 1, General Physics.

4. Organic Chemistry. This course comprises analysis of organic compounds, the preparation of typical organic substances, and a thorough study of the principles and theories of organic chemistry

Elective for seniors in the B. S. course who have had course 3. Three hours weekly throughout the year.

Students who elect Organic Chemistry will be expected to elect Course 1, General Biology, if they have not already pursued that course in their junior year.

5. Sanitary Chemistry. This course includes a limited study of quantitative methods, a thorough course in water analysis, and a short course in milk analysis.

Required of seniors in the sanitary engineering course. Two hours weekly during the fall and winter terms.

6. Honors. Students who have done satisfactory work in courses I and Ia, and who desire to emphasize chemistry in their college course, will be eligible for honors in the department. Such students will be required to do six credit hours of work in each of the junior and senior years and, at the close of the senior year, to pass an examination covering all the four years work. The time in the junior year will be given, in the fall and winter terms, to quantitative analysis, and in the spring term to working out some original problem involving analytical methods. In the senior year the work will include the regular course in organic chemistry, a course in physical chemistry, and reading of assigned works on general and industrial chemistry. At some time during the senior year the candidate will be expected to present a thesis describing his original work.

Biology and Geology

PROFESSOR STOLLER

1. General Biology. In this course a series of types of plants and animals is studied with reference to their comparative morphology and physiology. It is intended to make the work a discipline in the method of scientific study and to afford the student a knowledge of the broader facts and principles of biological science in their general philosophical values. Laboratory work, lectures and recitations, counting as a three-hour course. Optional for sophomores in the B. S. course. Three hours weekly throughout the year.

2. Biology and Geology. This course is intended to afford a general knowledge of these sciences as branches of liberal culture. The treatment is general and philosophical rather than technical but constant use is made of illustrative material. The course includes a consideration of the scientific evidences of organic evolution and the theories of evolution of various authors.

Optional for sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. Sanitary Biology. This is a descriptive course treating of bacteria as a group of organisms and especially of the applica-

tions of bacteriology in sanitation. Demonstrations of microscopic preparations and of culture methods in the examination of water and milk are given. Recitations and lectures, with demonstrations.

Required of seniors in the sanitary engineering course and in option A of the general engineering course. Two hours weekly during the second term.

4. Animal Morphology. This course is adapted for students who wish a somewhat advanced knowledge and training in biology, especially as a preparation for the medical profession. The work is mainly in the line of comparative anatomy and embryology and includes the dissection of several vertebrate types, including a mammal, in detail. The accompanying lectures and recitations deal with the principles of systematic zoology.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

5. Mineralogy and Geology. This course consists largely of laboratory and field work. It begins with the determination of common minerals and rocks. Structural and historical geology, especially as illustrated by the formations of the Mohawk valley and the Helderberg region are then taken up. Along with the practical work a text-book course in general geology is given.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Students electing this course are required to take as a collateral science course the course in general physics.

6. Economic Geology. In this course after a brief study of the principles of dynamic and structural geology the work is related to the occurrence and distribution in the United States of building stones, mineral ores, coal and other economic products.

Required of seniors in the B. E. courses, general and sanitary divisions. Two hours weekly during the first term.

7. Glacial Geology. Honor Course. A detailed study of the the deposits of the Pleistocene period as occurring in the region of the lower Mohawk valley and the interpretation of the con-

ditions under which they were laid down. Also a general study of the glacial period of geological history. This course includes at least 60 hours of field work. Prerequisite courses: 1 (or 2) and 5.

Physiology and Physical Training

DR. MCCOMBER

Human anatomy, physiology, hygiene and physical training are required in all courses. The work consists of recitations and lectures, demonstrated by means of the microscope, the manikin and the human skeleton. An attempt is made to give a practical course covering the essential facts of the subject with the idea of arousing in every student a genuine self interest, of developing a wholesome self respect without overwhelming him with the mass of details that must be considered in a close study of anatomy.

The course in hygiene is designed to acquaint the student with practical laws concerning the preservation of health and to impress upon his mind the dependence of health upon the consistent observance of such laws. Knowledge is of little value unless it find some application. Lectures on first aid to the injured, bacteriology, contagious and infectious diseases and social purity form a part of the course.

It is the aim of the department to give the student such a training in the methods of physical education that he may have a comprehensive knowledge of the subject, and to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Work in the gymnasium is required of freshmen only, but the organization of voluntary classes makes it possible for all to secure the advantages of systematic exercise. The course in the gymnasium is so arranged as to give a knowledge of the different kinds of apparatus pertaining to physical training. Commencing with light work, consisting of free gymnastics, club, dumb-bell and wand exercises, the course leads through a graded series, involving heavier work as the student becomes fitted for it.

Freshmen are required to pass an examination in gymnastics

at the end of the winter term, credit being based upon actual proficiency in the various exercises as indicated by such examination.

A physical examination of new students is made at the beginning of the year and corrective exercises are prescribed for the remedy of physical defects. Charts of the physical measurements showing the comparison of the individual with the normal development and hand books containing much valuable hygienic data are furnished upon payment of a small fee. All candidates for college teams are required to pass a satisfactory physical examination before they are allowed to compete in athletic contests.

It is the policy of the department, so far as the equipment will permit, to influence the entire student body to take an active part in athletic sports and gymnastics and not to cater to the exceptional athlete to the exclusion of those who are physically less perfectly equipped.

1. Physiology and Hygiene.

Required of freshmen in the academic courses. Two hours weekly throughout the year.

2. Physiology.

Required of freshmen in the engineering courses. One hour weekly during the first and third terms.

3. Gymnasium.

Required of freshmen in the academic courses. Two periods weekly during the second and third terms.

3a. Gymnasium.

Required of freshmen in the engineering courses. Two periods weekly during the second term.

4. Hygiene and First Aid.

Required of sophomores in the engineering courses. One hour weekly during the first term.

Special Lectures

It is the policy of the college to provide its students with the advantages of frequent lectures by specialists in the various departments of knowledge.

In endowing the Ichabod Spencer Professorship in Philosophy, Mrs. Katherine Spencer Leavitt set aside the sum of \$25,000 to establish a lectureship in memory of her father, the Reverend Ichabod Spencer, D. D., of the class of 1822, to be known as the Ichabod Spencer Lectureship in Psychology.

These lectures are given by distinguished scholars in this department, each year's course being published in book form.

Religious Life

Religious life among the students is cared for through the agency of the Union College Christian Association. This work is under the special care of a secretary who devotes his time to the religious interests of the students. Vesper services are held every Sunday afternoon throughout the year and eminent speakers are secured to conduct these services.

The Literary Societies

The Philomathean Society, founded in 1793, about two years prior to the founding of the college, and the Adelpic Society, founded in 1796, invite to membership all students specially interested in debating. The societies hold frequent meetings during the autumn and winter months for the discussion of current, social and political questions. A joint debate is held in December in competition for the Allison-Foote prizes (p. 151).

Library

The library occupies Nott Memorial Hall. It contains forty thousand volumes, and includes the engineering and scientific library of the late Professor Gillespie, the collection of mathematical works made by the late John Patterson, of Albany; the library of the late Hon. Henry J. Cullen, of the class of 1860, and the library of ancient and classical languages and literatures of the late Professor Tayler Lewis. The income from a bequest of five thousand dollars left by the late Lemon Thomson, Esq., of Albany, of the class of 1850, is devoted to the purchase of books on American subjects, especially history and political science. An alcove, known as the Thomson Alcove, is reserved

for these books. By the will of the late Rev. Oscar Blakeslee Hitchcock, of the class of 1852, a bequest of upwards of thirty thousand dollars was left to the college for the purchase of books, manuscripts, etc. A most important accession is the Croes Engineering Library, the gift of Mr. Edgar Beach Van Winkle of the class of 1860. This section of the library is in the General Engineering Building for the use of the engineering department of the college. The library is classified according to the Dewey decimal system and a dictionary card catalogue, on the Dewey plan, is now being prepared.

One hundred and fifteen periodicals and the transactions of many learned societies are received.

Library Rules.

Hours: 8-1; 2-6; 7:30-9 from Monday to Friday. 8-1; 7:30-9 on Saturday.

The library will be closed on Sundays and legal holidays.

The library will be open during vacation at hours to be announced.

Loan of books: Reference, Cullen and valuable books are not to be loaned.

Reserved books may be loaned over night, i. e., from 9 p. m. to 8 a. m. There will be a fine of \$1.00 per day or part of a day for each reserved book overdue.

Periodicals are regarded as reference books.

All other books may be loaned, not more than two at a time, for a period of two weeks, and may be once renewed, unless called for. A fine of ten cents per day will be charged for all books overdue, and all library privileges will be withdrawn until the book is returned and the fine paid.

The Natural History Museum

PROFESSOR STOLLER, CURATOR

Dr. D. S. Martin, Honorary Curator of the Wheatley Collection of Minerals.

The collections have recently been transferred to the third floor of Nott Memorial Hall. The opportunity has been used for

the re-inspection of all the material and for placing the collections in order with reference to their preservation and their educational use.

The Wheatley collection of minerals, presented to the college in 1858, by E. C. Delavan, Esq., contains 4,000 specimens, many of which represent the more valuable forms. This collection has recently been carefully inspected by Dr. D. S. Martin of New York city. All of the specimens have been re-identified and the entire collection has been re-arranged and placed in order for exhibition and for study. It has also been enriched by additional specimens, some of them from the personal collection of Dr. Martin, now presented to the college, and others from the Brooks collection, a gift to the college from Mr. Alfred H. Brooks of the United States geological survey, in memory of his father, a graduate of the college, by whom the collection was made.

In geology there is a general collection of rocks and minerals, and a considerable collection of paleozoic and mesozoic fossils. The collections made by the geological department under the direction of Professor C. S. Prosser so increased the museum that there is plenty of material now available, especially for the careful study of the paleozoic rocks and fossils of the New York formations. These have recently been examined, re-arranged and placed in cases for exhibition by Dr. Martin.

In zoology the collection of mounted birds numbers 311 specimens, representing 161 species of the bird fauna of the eastern United States. These have recently been carefully inspected, and re-labelled. A considerable number of specimens of Porto Rican birds, collected and presented to the college by Mr. Byron W. Reed of the class of 1906, and mounted by Mr. John R. Nowell of the class of 1905, have been added. Of mammals there is a collection of 57 skins, the gift of the U. S. National Museum, and a number of skulls, skeletons and mounted specimens. Fishes, amphibia and reptiles, especially of the local fauna, are represented by specimens in alcohol. In the department of invertebrates the collections of marine animals made by Dr. Harrison E. Webster are extensive, including sponges, corals, worms,

crustacea and mollusks, the total number of species represented being over 5,000. The Wheatley collection of shells, presented by E. C. Delavan, Esq., consists of 8,000 specimens.

The botanical collections include a nearly complete set of local flowering plants, the work of Professor Jonathan Pearson. To this there has since been added a complete set of the ferns and fern allies of Schenectady county. The flora of the United States is further represented by collections from Virginia, the Red River region of the southwest, and those made by Dr. Nevins in Alabama. The lower cryptogams are represented by a valuable collection of 2,300 specimens of fungi, the gift of Mr. J. B. Ellis, of the class of 1851. The herbarium also includes a considerable number of foreign plants, including representative collections from Germany, Spain, Asia Minor and England, as well as some specimens from Iceland, Norway, France and Switzerland. They have been sorted and distributed in a single series following the latest accepted sequence, that of Engler and Prantl's *Natürliche Pflanzenfamilien*, making the entire collection of some 8,000 or 10,000 specimens readily accessible for reference and study.

The museum is open to the public on Wednesday afternoon and Saturday morning. Visitors may be admitted at other times by making application to the college librarian.

CURRICULA OF ACADEMIC COURSES

The numeral after a subject refers to the course as described in the departmental statement; the number in parenthesis refers to the page where the statement is given. The hours show the time given the subject each week in the class room.

Course leading to Degree of A.B.

Freshman Year

Greek 1.....	(42).....	4 hours
Latin 1.....	(44).....	4 hours
English 1.....	(52).....	3 hours
Mathematics 1, 2, 3.....	(61).....	4 hours
Physiology and Hygiene 1.....	(70).....	2 hours

Total 17 hours

In the second and third terms one credit hour is required in Gymnastics

Sophomore Year

Greek 3.....	(42).....	4 hours
Latin 2.....	(44).....	3 hours
English 3.....	(53).....	3 hours
History 1.....	(56).....	4 hours
Mathematics 4a.....	(62).....	3 hours
or		
Biology and Geology 2.....	(67).....	3 hours

Total 17 hours

Junior Year

Rhetoric 11.....	(55).....	1 hour
Electives.....	(80).....	15 hours

Total 16 hours

Senior Year

Rhetoric 12.....	(55).....	1 hour
Electives.....	(81).....	15 hours

Total 16 hours

Course leading to Degree of Ph.B.

Freshman Year

Latin 1.....	(44).....	4 hours
German 1b.....	(46).....	5 hours
or		
French 1b.....	(50).....	5 hours

English 1.....(52).....	3 hours
Mathematics 1, 2, 3.....(61).....	4 hours
Physiology and Hygiene 1....(70).....	2 hours

Total 18 hours

In the second and third terms one credit hour is required in Gymnastics

Sophomore Year

Latin 2.....(44).....	3 hours
German 2.....(47).....	5 hours
or.	
French 2.....(50).....	5 hours
English 3.....(53).....	3 hours
History 1.....(56).....	4 hours
Mathematics 4a.....(62).....	3 hours

or

Biology and Geology 2.....(67).....	3 hours
-------------------------------------	---------

Total 18 hours

Junior Year

Rhetoric 11.....(55).....	1 hour
Electives.....(80).....	15 hours

Total 16 hours

Senior Year

Rhetoric 12.....(55).....	1 hour
Electives.....(81).....	15 hours

Total 16 hours

Course leading to Degree of B.S.

Freshman Year

German 1b.....(46).....	5 hours
or	
French 1b.....(50).....	5 hours
English 1.....(52).....	3 hours
Mathematics 2a, 3a, 4.....(62).....	5 hours
Chemistry 1a.....(65).....	3 hours
Physiology and Hygiene 1....(70).....	2 hours

Total 18 hours

In the second and third terms one credit hour is required in Gymnastics

Sophomore Year

German 2.....(47).....	5 hours
or	
French 2.....(50).....	5 hours
English 3.....(53).....	3 hours

History 1.....(56).....	4 hours
Mathematics 5.....(62).....	3 hours
Chemistry 2a.....(66).....	3 hours
or	
Biology 1.....(67).....	3 hours
	<u>Total 18 hours</u>

Junior Year

Rhetoric 11.....(55).....	1 hour
Electives.....(80).....	15 hours
	<u>Total 16 hours</u>

Senior Year

Rhetoric 12.....(55).....	1 hour
Electives.....(81).....	15 hours
	<u>Total 16 hours</u>

The list of electives is given in full with the schedule time of each on pages 80-82. The general conditions governing the choice of electives are stated on page 80. The detailed outline of work in each subject and any restrictions limiting its election are given under the departmental statements on page 42-70.

SCHEDULE OF REQUIRED STUDIES IN THE ACADEMIC COURSES

Freshman Year

A. B. Course

Greek, 4 hours.....	T., W., F., S., 9-10
Latin, 4 hours.....	M., T., Th., S., 11-12
English, 3 hours.....	M., W., F., 8-9
Mathematics, 4 hours.....	M., W., Th., F., 1:30-2:30
Physiology and Hygiene, 2 hours.....	T., Th., 8-9

Ph. B. Course

Latin, 4 hours.....	M., T., Th., S., 11-12
German, 5 hours.....	M., T., W., F., S., 9-10
or	
French, 5 hours	M., T., W., F., S., 9-10
English, 3 hours.....	M., W., F., 8-9
Mathematics, 4 hours.....	M., W., Th., F., 1:30-2:30
Physiology and Hygiene, 2 hours.....	T., Th., 8-9

B. S. Course

German, 5 hours.....	M., T., W., F., S., 9-10
or	
French, 5 hours.....	M., T., W., F., S., 9-10
English, 3 hours	M., W., F., 8-9
Mathematics, 5 hours.....	M., W., Th., F., S., 11-12
Chemistry, 3 hours.....	T., Th., 10-11; F., 1:30-3:30
Physiology and Hygiene, 2 hours.....	T., Th., 8-9

Sophomore Year

A. B. Course

Greek, 4 hours.....	T., W., Th., F., 11-12
Latin, 3 hours.....	M., W., F., 9-10
English, 3 hours.....	T., Th., S., 8-9
History, 4 hours.....	M., T., Th., S., 10-11
Mathematics, 3 hours.....	M., W., F., 8-9
or	
Biology and Geology, 3 hours.....	M., W., F., 8-9

Ph. B. Course

Latin, 3 hours.....	M., W., F., 9-10
---------------------	------------------

German, 5 hours.....	T., W., Th., F., S., 11-12
or	
French, 5 hours.....	T., W., Th., F., S., 11-12
English, 3 hours.....	T., Th., S., 8-9
History, 4 hours.....	M., T., Th., S., 10-11
Mathematics, 3 hours.....	M., W., F., 8-9
or	
Biology and Geology, 3 hours.....	M., W., F., 8-9

B. S. Course

German, 5 hours.....	T., W., Th., F., S., 11-12
or	
French, 5 hours.....	T., W., Th., F., S., 11-12
English, 3 hours.....	T., Th., S., 8-9
History, 4 hours.....	M., T., Th., S., 10-11
Mathematics, 3 hours.....	M., W., F., 9-10
Chemistry, 3 hours.....	M., W., 1:30-4:30
or	
Biology, 3 hours.....	M., W., 1:30-2:30 F., 1:30-3:30

Junior Year**All Courses**

Rhetoric, 1 hour.....	S., 10-11
-----------------------	-----------

Senior Year**All Courses**

Rhetoric, 1 hour.....	F., 3:30-4:30
-----------------------	---------------

For statement of work in each subject see pages 42-70

SCHEDULE OF JUNIOR AND SENIOR ELECTIVES

A total of fifteen hours is required.

Each student is required to choose two electives to be continued for two years, one of which must be the continuation of a subject previously pursued in college.

Any student in the Ph. B. course may take the A. B. degree if he elects Greek for five hours in the junior and senior years.

The head of a department may direct the choice of electives in other departments, for honor students, to the number of six hours in each year.

Subjects that conflict have been placed in the same group.

Junior Groups

For limiting conditions, see statements of respective departments.

Group I

German 3, 3 hours.....	M., W., F., 8-9
German 3a, 3 hours.....	M., W., F., 8-9
Greek 5, 3 hours.....	M., W., F., 8-9

Group II

Mineralogy, 3 hours.....	T., Th., S., 8-9
American History, 3 hours.....	T., Th., S., 8-9
French 3, 3 hours.....	T., Th., S., 8-9
French 3a, 3 hours.....	T., Th., S., 8-9

Group III

Mathematics 5, 3 hours.....	M., W., F., 9-10
English 4, 3 hours.....	M., W., F., 9-10

Group IV

Latin, 3 hours.....	T., Th., S., 9-10
Mathematics 6, 3 hours.....	T., Th., S., 9-10

Group V

Economics, 3 hours.....	M., W., F., 10-11
Greek 6, 5 hours.....	M., T., W., Th., F., 10-11

Group VI

General Chemistry, 3 hours.....	T., Th., 10-11; F., 1:30-3:30
Argumentation, 2 hours.....	T., Th., 10-11
Greek 6, 5 hours.....	M., T., W., Th., F., 10-11

Group VII

European History, 3 hours.....	M., W., F., 11-12
Mechanics and Physics, 3 hours.....	M., W., F., 11-12
English 6, 3 hours.....	M., W., F., 11-12

Group VIII

English 5, 3 hours.....	T., Th., S., 11-12
Logic, Psychology and Ethics, 3 hours.....	T., Th., S., 11-12

Group IX

Qualitative Analysis, 3 hours.....	M., W., 1:30-4:30
Laboratory Physics, 3 hours.....	M., 1:30-2:30; W., F., 1:30-3:30
General Chemistry, 3 hours.....	T., Th., 10-11; F., 1:30-3:30
Spanish, 3 hours.....	M., W., F., 1:30-2:30

Group X

Quantitative Analysis, 3 hours.....	T., Th., 1:30-4:30
-------------------------------------	--------------------

Senior Groups

For limiting conditions, see statements of respective departments.

Group I

Constitutional History, 3 hours.....	M., W., F., 8-9
French 4, 3 hours.....	M., W., F., 8-9
French 4a, 3 hours.....	M., W., F., 8-9

Group II

German 4a, 3 hours.....	T., Th., S., 8-9
German 4, 3 hours.....	T., Th., S., 8-9
Greek 7, 3 hours.....	T., Th., S., 8-9

Group III

Economics, 3 hours.....	M., W., F., 9-10
Physics 5, 3 hours.....	M., W., F., 9-10
Greek 9, 3 hours.....	M., W., F., 9-10

Group IV

Mathematics 6, 3 hours.....	T., Th., S., 9-10
English 7, 3 hours.....	T., Th., S., 9-10
Sociology, 3 hours.....	T., Th., S., 9-10

Group V

Latin, 3 hours.....	M., W., F., 10-11
Mathematics 7, 3 hours.....	M., W., F., 10-11

Group VI

Advanced Psychology (first term), 3 hours....	T., Th., S., 10-11
Advanced Ethics (second term), 3 hours.....	T., Th., S., 10-11
Evolution of Religion (third term), 3 hours....	T., Th., S., 10-11
Mathematics 8, 3 hours.....	T., Th., S., 10-11
Latin 6, 3 hours.....	T., Th., S., 10-11

Group VII

English 8, 3 hours.....	M., W., F., 11-12
History of Philosophy, 3 hours.....	M., W., F., 11-12

Group VIII

Comparative Politics, 3 hours.....	T., Th., S., 11-12
Mathematical Physics, 3 hours.....	T., Th., S., 11-12
English 9, 3 hours.....	T., Th., S., 11-12

Group IX

Qualitative Analysis, 3 hours.....	M., W., 1:30-4:30
Organic Chemistry, 3 hours.....	M., W., 1:30-4:30
Laboratory Physics, 3 hours....	M., 1:30-2:30; W., F., 1:30-3:30
Greek 8, 5 hours.....	M., T., W., Th., F., 1:30-2:30
History of Education, 3 hours.....	M., W., F., 2:30-3:30
Spanish, 3 hours.....	M., W., F., 2:30-3:30

Group X

Quantitative Analysis, 3 hours.....	T., Th., 1:30-4:30
Animal Morphology, 3 hours.....	T., Th., 1:30-4:30
Greek 8, 5 hours.....	M., T., W., Th., F., 1:30-2:30
Advanced Argumentation, 2 hours.....	T., 2:30-4:30

For statement of work in each subject see pages 42-70

THE ENGINEERING SCHOOL

Historical. When Union College was chartered, in February, 1795, the only American colleges west of the Hudson River were William and Mary, Princeton, Hampden-Sidney, Rutgers and Dickinson. These, as well as the New England colleges, were all denominational; Union was the first strictly non-sectarian American college, and its name was inspired in part by this novel characteristic. The first full professorship in natural science in an American college was founded at Union and it is a matter of special scientific interest that Prof. F. R. Hassler was called from this chair in 1811 to establish the United States Coast Survey.

The engineering school of Union College is one of the oldest technical schools of the country. Founded in 1845 with Prof. William M. Gillespie at its head, it at once took high rank, and for many years was one of the few engineering schools in America. From the first it appears to have been the evident policy of the school to adapt the thorough training of L'Ecole des Ponts et Chaussées, of Paris, France, where Prof Gillespie had finished his technical education, to the demands of professional practice in a vigorous new country, where resources and opportunities were abundant, and where capital and professional precedent were wanting. From the characteristic tendencies impressed on the school at its foundation it has never departed, although it has endeavored to keep pace with the development in American technical education and with the increased demands on professional training. For many years civil engineering only was taught; then, as the principles of modern sanitary science came to be better understood and the possibilities of their further development and their utilization as life-saving agencies were discerned, a course in sanitary engineering was established; and more recently a course in electrical engineering was added.

During its whole history the school of engineering at Union has stood for broad, fundamental training rather than for narrow specialization and during recent years, since its advanced entrance requirements have made room in the course, increased time and attention have been given to culture studies and to a larger proportion of academic training.

Local Advantages. Schenectady is a peculiarly favorable location for an engineering school. The city is on the Mohawk River, and is intersected by several steam railroads, a number of inter-urban trolley lines and the Erie Canal, furnishing many bridges and other engineering works. At Schenectady are also located the works of the General Electric Company and of the American Locomotive Company, each an extensive and leading industry in its respective line. Among other interesting engineering features, may be mentioned the city grade-crossings improvement recently completed at a cost of a million dollars, and the city waterworks, which contain in their outfit a system of ground-water wells and a recently installed set of electrically-driven multiple-stage centrifugal pumps, of twenty million gallons daily capacity. The neighboring cities of Albany, Troy and Cohoes, as well as the surrounding territory, offer numerous examples of good engineering and many features of value as aids in engineering training. Among these may be mentioned the scientific departments of the state government at Albany, comprising the state engineer's department, which includes also the new barge canal, the good roads division and the bureau for testing materials; the headquarters of the state water supply commission, which includes also the state river improvement work; the headquarters of the Public Service Commission for district No. 2; the state library, which is well supplied with technical and engineering works; the Albany city water filtration plant; at Troy, the Burden iron works and the Gurley engineering instrument manufactory; at Watervliet, the United States arsenal and gun factory; the water power developments and electric power transmission plants at Mechanicville, Spier Falls, Schaghticoke and Johnsonville; the hydraulic cement works at Glens Falls and at Howe's Cave; and the modern sewage disposal systems at Saratoga Springs, Ballston Spa and Scotia. The new barge canal will pass the Cohoes falls by a flight of locks and will pass Schenectady by a system of locks and dams, both permanent and movable, now under construction, which will canalize the Mohawk River, calling for extensive and interesting engineering operations. All these sources of aid are utilized in the work of the school.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
Professor of History and Government

OLIN H. LANDRETH, A. M., C. E., SC.D.
Professor of Civil Engineering

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D., SC.D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Professor of Modern Languages

HORACE GRANT MCKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. MCCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

GEORGE DWIGHT KELLOGG, PH. D.
Professor of the Latin Language and Literature

JAMES BOYD KENNEDY, PH. D.
Professor of Economics

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

MORTON COLLINS STEWART, PH. D.
Assistant Professor of German

STANLEY PERKINS CHASE, PH. D.
Assistant Professor of English

WALTER LYMAN UPSON, E. E., M. S., M. E. E.
Assistant Professor of Electrical Engineering

JAMES H. CUNNINGHAM, M. E. E.
Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

WALTER SCOTT HASTINGS, A. M.
Instructor in French

CHARLES G. ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

ALBERT JACOB SALATHE, A. M.
Instructor in Chemistry

J. L. HAYDEN
Lecturer on Arc Lighting and Photometry and Supervisor of
Electrical Engineering, Thesis Work

Ichabod Spencer Lecturers on Psychology

RUDOLF EUCKNER, PH. D., D. D.
EDWARD LEE THORNDIKE, A. M., PH. D.

COURSES OF STUDY

General Education and Technical Training. In the training of a young man for his professional work two distinct methods are open. One is to separate his professional work from his general educational training and to complete the latter before the former is commenced. This is the plan followed in the professional schools of theology, law and medicine. The other plan is, after the student has reached a certain point in his studies to have him carry forward at the same time his general education and his technical training. This plan is the one generally followed in engineering schools, as it has been found by engineering educators and professional engineers to yield better results in practice than the former plan. The point selected at which the technical training shall commence is the beginning of the college course, the time of which is divided between general studies and technical studies. In the Union College engineering courses the time allotted to these two divisions is about equal, though the two are carried on simultaneously, the general training being given, however, more time in the early part of the course and less in the latter part.

Undergraduate Courses. Four undergraduate courses of study in engineering are offered, three extending through four years and one extending through six years: (1) A four-year course in general engineering, which is intended to give the basis of a broad engineering education, including the fundamental principles underlying the special branches of the profession; (2) A four-year course in sanitary engineering which differs from the general engineering course by substituting special work in sanitary subjects for some of the general engineering studies; and (3) a four-year course in electrical engineering, in which the last two years are devoted to essentially mechanical and electrical engineering subjects.

These three courses are identical during the first two years, the sanitary course differing slightly from the general during the last two years, while the electrical course in its last two years differs widely from the other courses. The degree of Bachelor

of Engineering (B. E.) is given for the successful completion of any one of the above three courses.

A six-year course in general engineering is also offered comprising the above four-year course in general engineering, course (I), and the regular four-year Latin-scientific course of the academic department, with the subjects of the two courses properly interwoven during each term. The course thus offers a combined college and technical training with the subjects of the two properly correlated. The degrees of Bachelor of Engineering (B. E.) and of Bachelor of Philosophy (Ph. B.) are given on the satisfactory completion of this course.

Graduate Courses. In addition to the above undergraduate courses in engineering, three graduate courses and degrees are offered:

The degrees of Master of Civil Engineering (M. C. E.) and of Master of Electrical Engineering (M. E. E.) are given on the satisfactory completion of one-year graduate courses of study in civil engineering and in electrical engineering, respectively. The degree of Doctor of Philosophy (Ph. D.) is given to candidates who have received the master's degree, on the completion of an additional course of two years of graduate study in electrical science.

STUDIES OF THE FOUR COURSES

The following is an outline of those studies which in general are common to the three four-year courses in general, sanitary, and electrical engineering and to the six-year general engineering and Latin-scientific course. The studies which are peculiar to each are outlined under the separate departments.

Following the distinction between the two kinds of training above mentioned, the studies here outlined are arranged under the two heads of general studies and technical studies.

General Studies

Physics. The instruction in physics comprises a series of lectures on experimental physics, accompanied by classroom and

laboratory work. Physical laboratory work is required of all engineering students.

See pages 63-65 for detailed statement.

Chemistry. General chemistry is taught by lectures, recitations and laboratory work during the freshman and sophomore years and laboratory work in qualitative analysis is continued through the first term of the junior year. Sanitary engineering students, in addition to the above, take chemical laboratory work during the first and second terms of the senior year.

See pages 65-67 for detailed statement.

Astronomy. The instruction in astronomy includes physical astronomy, spherical trigonometry and the theory of astronomical instruments. These studies are preparatory to the work in astronomical surveying and geodesy given in the general engineering course. In the electrical engineering course the work is confined to descriptive astronomy.

See pages 63-65 for detailed statement.

Biology. Physiology is a required study in each of the three engineering courses. Structural botany is given in the general and sanitary courses, and bacteriology is given in the sanitary course. Structural botany includes the microscopic study of the vegetable cell, the tissues and the tissue-system of the higher plants with special reference to the use of woods in the constructive arts. In bacteriology some of the common bacteria of water, air and soil are studied according to the methods of modern bacteriological work. The accompanying lectures treat of bacteria in regard to their place and role in nature and their relations to sanitary science.

See pages 67-69 for detailed statement.

Geology. (Not required in the electrical engineering course). This work comprises a course in economic geology, which includes the general principles of geology and a discussion of the occurrence and distribution of minerals and mineral materials for construction in the United States.

See pages 67-69 for detailed statement.

English. The instruction in English aims at a general acquaintance with English literature and a correct, clear and forcible use of the language. Rhetoric is studied throughout the freshman year. In the first term a summary review of diction is given. In the second and third terms more attention is given to the development of thought by work upon kinds of composition and the paragraph. In the sophomore year English literature as represented by the work of the essayists and by Shakespeare is studied. In the senior year one of the required essays of each term will be upon a technical subject prepared under the direction of the professor of civil engineering, the object being to give the engineering student practice in the preparation of clear, concise and systematic reports on engineering subjects.

See pages 52-56 for detailed statement.

Modern Languages. All engineering students at the time of entrance must have had two years of either French or German. After entering they are required to pursue French and German each for one year. This will be advanced work for the language offered at entrance, and elementary work in the language not offered. Some work in scientific French and scientific German is done during the latter part of the course.

See pages 45-52 for detailed statement.

History and Economics. American history throughout the junior year and economics during the first term of the senior year are required of all engineering students.

See pages 56-57 for detailed statement.

Economics, Political Science and International Law. General engineering students who elect Option B in engineering administration are required to have economics during the three terms of the senior year, political science during the first two terms, and international law during the last term.

See pages 60-61 for detailed statement.

Physiology and Physical Training.

See pages 69-70 for detailed statement.

Studies of the Six-year Engineering and Latin-Scientific Course. For the studies of this course not described above, see the cur-

riculum on pages 133-138 and the detailed descriptions as follows:—

Latin.	Page 43
English Literature	Page 52
Rhetoric.	Page 55
History.	Page 56
Sociology.	Page 60
Logic, Psychology	Page 58
Biology, Geology	Page 67

Voluntary Studies. Any of the studies of the classical course or of the scientific course of the college may be taken by engineering students without extra charge, on approval of the faculty.

Mathematical and Technical Studies

The following mathematical and technical subjects are included in each of the three engineering courses, and the instruction therein is given in the general engineering department.

Mathematics

To the engineer the subject of mathematics is essential not only for its disciplinary training, but also for its practical applications and use. Both these features receive due consideration in the teaching of the subjects under this head, especial effort being made to incite the student to independent thinking, and to enable him to apply his knowledge of mathematics to his technical work, at the same time holding him to rigorous methods and logical conclusions.

The following courses are required:

G.E.1. Algebra. This is a course in advanced algebra, including the graphical treatment of imaginaries, determinants and graphical algebra.

Required of all engineering freshmen. Four hours weekly during the first term.

G.E.2. Plane Trigonometry. This course aims to give a review of plane trigonometry; to acquaint the student with means of testing the accuracy of his work; to make applications to practical problems; and to extend his knowledge to higher plane

trigonometry. This course presupposes the one-half unit required for admission.

Required of all engineering freshmen. Two hours weekly during the first term.

G.E.3. Analytical or Coordinate Geometry. This course in plane and solid analytical geometry includes an investigation of the more important higher plane curves.

Required of all engineering freshmen. Four hours weekly during the second term and three hours weekly during the third term.

G.E.4. Differential Calculus. This course aims to acquaint the student with the principles of deriving the formulas for derivatives of algebraic and transcendental functions, and to make him skilful in the use of formulas with their practical application.

Required of all engineering freshmen. Three hours weekly during the third term.

G.E.5. Differential and Integral Calculus. This course provides drill in the fundamentals of integration; the application of derivatives to curves; maxima and minima; the development of series; problems involving rates, curvature, surfaces and volumes; the application of calculus to problems in mechanics. This course presupposes G.E.4.

Required of all engineering sophomores. Three hours weekly during the first and second terms and two hours weekly during the third term.

G.E.6. Analytical Mechanics. The subjects taught under this head are statics, dynamics, hydro-statics, hydro-dynamics, and pneumatics. These studies form the foundation for applied mechanics, strength of materials and stresses in framed structures, all of which are fundamental to engineering designing.

Required of all engineering sophomores. Three hours weekly during first term and two hours weekly during the second and third terms.

G.E.7. Engineering Mathematics. This course gives a review of the algebra, trigonometry, analytical geometry, calculus, and

analytical mechanics, required of general engineers during the first three years, showing the logical connection of the several subjects and their application to engineering problems.

Required of all engineering seniors. Two hours weekly during the first and second terms.

Drawing and Descriptive Geometry

The following courses are required:

G.E.11. Freehand Drawing. This course includes the study of form, proportion, and perspective; light and shade; the æsthetics of decorative and applied design; drawing from models; and engineering lettering.

Required of all engineering freshmen. One lecture and two drawing periods weekly during the first term.

G.E.12. Mechanical Drawing. This course takes up the study of projections of solids in the four quadrants; the development of working drawings; isometric and oblique projections; care and use of drawing instruments; mechanical lettering; and blue printing. Architectural and engineering subjects are treated in the working drawings.

Required of all engineering freshmen. One lecture and two drawing periods weekly during the second term.

G.E.13. Descriptive Geometry. This course is a continuation of G.E.12. Original problems relating to the stationary and revolved positions of points, lines and planes are given in addition to the study of the first seventeen problems of Church's Descriptive Geometry. The application of the subject to practical problems is emphasized.

Required of all engineering sophomores. One recitation and two drawing periods weekly during the second term.

G.E.14. Descriptive Geometry (continued). This course is a continuation of G.E.13. Study is made of problems relating to tangent planes; intersections and developments of plane and curved surfaces; shades and shadows. Practical application to roofs, shafting, sheet iron work, and various architectural and engineering details are considered. Use is made of the Shroeder

models, the Olivier models and the models of intersection of the Paris polytechnic school.

Required of all engineering sophomores. One recitation and two drawing periods weekly during the third term.

Surveying

The following courses are given:

G.E.21. Mensuration. A thorough study is made of pure and applied mensuration of lines, planes and solids, making a valuable preparation for the work in surveying.

Required of all engineering freshmen. Two hours weekly during the second term.

G.E.22. Surveying and Plotting. A careful study is made of surveying instruments, treating their geometrical, optical and mechanical relations; their adjustments and use; and the determination of their instrumental constants, errors and limits of precision. The classes are divided into small sections and directed by the instructors. Office computations, plotting and mapping are made adjuncts of the field survey.

Required of all engineering freshmen. One recitation and one field or drawing period during the third term.

G.E.23. Topographical Surveying. This course is a continuation of G.E.22, and consists of a study of the methods of plane surveying. Field work is conducted along thoroughly practical lines and a complete traverse, with its details, is worked out by each student.

Required of all engineering sophomores. One recitation and one field drawing period during the first term.

G.E.61. Engineering Lectures. Lectures are given on topics pertaining to the training and qualifications of an engineer and to the engineering profession. Students are assigned parallel readings bearing on these topics.

Required of all engineering freshmen. One hour weekly during the first and second terms.

G.E.62. Summer Vacation Work. All students in the Engineering courses during their summer vacation following the freshman, sophomore and junior years are required to prepare a report on their summer work. This report must be done under one of the following options:

1. Actual participation in engineering work.
2. Investigation by research and reading.
3. Critical examination of some engineering project.
4. Critical reading and abstract of a stated amount from an approved list of books. The details of these options are announced by the department.

The work is due at the opening of the fall term.

G.E.63. Commencement Term Work. In addition to the weekly field and laboratory exercises throughout the year, all freshman and sophomore engineering students, and juniors in the general engineering course, are given an uninterrupted fifteen days' course in field-practice and laboratory work supplementary to the studies in which such practice is desirable. The course begins on the day (Thursday) following Commencement and continues through that and the two following weeks. The work is so selected and arranged as not only to supplement the studies of the year, but also to give instruction and practice in the organization, operation and direction of work conducted by engineering parties. This work receives three hours' credit in the fall term grades.

Thesis. Each candidate for graduation is required to present on or before the third Wednesday in May of his graduation year a satisfactory thesis on a subject that has been approved by the professors of civil engineering or of electrical engineering. This thesis must be original in its character and may be either a design for some engineering structure or plant, process or operation, or an independent investigation of some principle, problem or matter of engineering importance. Reviews or copies of existing structures, plants or processes, unless of special educational value or involving original investigation, will not be approved as subjects. This thesis is to be in

a form prescribed at the time of approval of the subject, and is to be bound for deposit in the library of the engineering school, and must be presented in this shape on or before the stipulated date. The subjects, with outlines of the proposed treatment, must be submitted in time for final approval not later than November 1st preceding graduation, and the work on the theses must be presented for inspection and criticism of the professor in charge of the department at intervals during progress

GENERAL ENGINEERING DEPARTMENT

Two Optional Courses. In the four-year general engineering courses two optional courses are offered, either of which may be selected by general engineering students at the beginning of the junior year, and each of which extends through the junior and senior years.

The first of these courses, designated as Option A, offers a broad, fundamental, general engineering training such as a thoroughly trained engineer should have before specializing in any of the branches of the profession.

The other course, designated as Option B, while in the main identical with the former, differs from it by omitting some of the more technical subjects, such as stereotomy, kinematics, least squares, sewerage, geodesy and field astronomy, and by substituting therefor, sociology, the elements of law, political science and international law, the principles of finance and financial operations, the principles of business management and accounting, and additional work in history and in engineering law and procedure. The object of this course is to offer to engineering students an opportunity better to qualify themselves for engineering positions of an executive or administrative character. These two options are also offered in the six-years general engineering course and extend through the fifth and sixth years.

The details of these two optional courses will be found on pages 127, 128, 130, 131, 136, 137, 138.

In addition to the studies common to all engineering courses previously described on pages 88-95, the following subjects are included in the general engineering course:

Mathematics (continued)

These subjects are required:

G.E.8. Least Squares. This course treats of the fundamental principles and processes of the method of least squares, and their application to the solution of astronomical, physical and engineering problems.

Required of general engineering seniors in Option A. Three hours weekly during the second term.

G.E.9. Spherical Trigonometry and Astronomy. A short course in descriptive and mathematical astronomy with some preliminary work in spherical trigonometry is given by the Department of Physics.

Required of general engineering juniors in Option A. Three hours weekly during the third term.

Drawing and Descriptive Geometry (continued)

The following subjects are required of general engineers:

G.E.15. Natural Perspective. This is a course in the theory of perspective with practical applications to architectural and engineering drawings.

Required of general engineering juniors in Option A. One drawing period weekly during the third term.

G.E.16. Stereotomy. This course is a thorough study of stone cutting, together with the construction layout of stone structures and is a drawing course.

Required of general engineering juniors in Option A. Two drawing periods weekly during the third term.

G.E.17. Machine Drawing. This work supplements the classroom work in kinematics. A study is made of the representation of machine motions and their analyses, including gears and their motions.

Required of general engineering juniors. One drawing period weekly during the second term.

Surveying (continued)

The following courses are required.

G.E.24. Topographical Surveying. The class room work con-

siders various kinds of surveying, including land, city, mining, and hydrographic surveying. Field practice in topographical methods, stadia traversing, and triangulation supplements the recitation work. A map is plotted during the term.

Required of general engineering juniors. Two recitations and one field drawing period weekly during the first term.

G.E.25. Route Surveying. A rigorous study is made of the elements of railroad reconnaissance and location, including the details of railroad curves and turnouts. A considerable portion of the time is spent in field problems and in the practical methods employed in office computations.

Required of general engineering juniors. Two recitations and one field period weekly, during the third term.

G.E.26. Geodesy and Field Astronomy. After a study of the fundamental principles of the adjustment of errors and their use in establishing empirical formulas, a discussion of the figure of the earth, triangulation, base lines, and precise leveling is taken up. This study is accompanied by field work, which includes the determination of time, latitude, and azimuth, with ordinary instruments and with observatory methods and instruments.

Required of general engineering seniors in Option A. Two recitations and one field period weekly during the second and third terms.

Engineering Design and Construction

The following courses are required:

G.E.31. Applied Mechanics. This course comprises the extension of analytical mechanics and the development of the methods of graphical analysis with their applications to engineering problems, operations and constructions, particularly the treatment of stresses, strains, deflections and deformations in elastic materials and structures due to extraneous forces.

Required of general engineering juniors. Four hours weekly during the first term.

G.E.32. Mechanics of Materials. This course is an application of portions of G.E.31 to mechanics of materials. In conjunction with this work is given the study of the production, preparation,

strength and physical properties of the various engineering materials, including timber, stones, cement and lime mortar, cast iron, wrought iron and structural steel. Practice in the engineering laboratory is an important adjunct to this study.

Required of general engineering juniors. Five hours weekly during the second term.

G.E.33. Stresses.

Required of general engineering juniors. Four hours weekly during the third term.

G.E.34. Engineering Stresses.

Required of general engineering seniors. Four hours weekly during the first term.

G.E.35. Engineering Design.

Required of general engineering seniors. Four hours weekly during the second and third terms.

The courses in applied mechanics and materials and engineering stresses prepare the student to undertake the study of engineering design proper, which is pursued throughout the senior year; an important feature of this course is the work in bridges, railroads and water-power development, architectural engineering, etc. The exercises in this line of work are, as far as possible, chosen from professional practice, and the student is expected to carry out, from assigned data and conditions, the preliminary study, determinations of stresses, types, dimensions and details, and to turn in the results in the form of working drawings, diagrams and memoirs. The course is preceded by a series of lectures on the principles and economics of designing. The department possesses a large collection of drawings and photographs of representative engineering structures from which students can form correct ideas of modern practice in the designing of details and in the methods followed on works of this class. The course in senior engineering design is also supplemented by actual design in the drafting room.

G.E.36. Building Construction. This is a recitation and lecture course on the principles and practice of building construction,

including a discussion of the proportions and properties of concrete, plain and reinforced, as applied to construction work.

Required of general engineering seniors. Two hours weekly during the second term.

G.E.37. Railroad Construction. In this course, which is a continuation of the course in junior route surveying (G.E.25), a complete investigation is made of railroad equipment; location and construction; maintenance of way; buildings and yards. A railroad route with its terminal is made in the field and the plans and estimate are computed in the drafting room.

Required of general engineering seniors in Option A. Three recitations and two field or office periods weekly during the first term.

G.E.38. Highways and Pavements. The course in highways comprises a consideration of the highway as an element in the transportation system of the state and of the principles of its economic location and proper construction, with a study of modes of construction, materials, maintenance, and systems of highway laws and administration.

There is also a study of the methods of laying out and grading streets and pavements and of the various street accessories, paving methods and materials and their treatment, with special reference to their economic and sanitary aspects.

Required of general engineering juniors. Four hours weekly during the first term.

Engineering Law and Procedure

These courses are given:

G.E.41. Engineering Law and Procedure. This course includes a treatment of the fundamental development of law from the Roman and English Common Law, the function of the state in general, and the American system of federal and state jurisdiction in particular. Some attention also is given to fundamental bases of laws, contracts, agency, and property rights.

Required of general engineering seniors in Option A, and of electrical engineering seniors. Three hours weekly during the third term.

G.E.42. Elements of Law.

Required of general engineering juniors in Option B. Three hours weekly during the second term.

G.E.43. Law of Property and Contract.

Required of general engineering juniors in Option B. Three hours weekly during the third term.

G.E.44. Principles of Law of Corporations.

Required of general engineering seniors in Option B. Three hours weekly during the first term.

This course includes a treatment of the fundamental development of law, the function of the state in general and the American system of federal and state jurisdiction in particular. Attention is given to the fundamental bases of laws, contracts, agency, property rights, and corporation and municipal laws. The subjects are treated more extensively than in Option A (G.E.41).

Principles of Finance, Business, Accounting

These courses are offered:

G.E.46. Principles of Finance.

Required of general engineering seniors in Option B. Two hours weekly during the second term.

G.E.47. Principles of Administration.

Required of general engineering seniors in Option B. Three hours weekly during the third term.

G.E.48. Principles of Accounting.

Required of general engineering seniors in Option B. Three hours weekly during the third term.

General engineering students who elect Option B are given instruction in the principles of finance and financial operations, the principles of business and of industrial organization, and the principles of accounting and of cost-keeping.

G.E.51. Hydraulics. This course is a study of the fundamentals of hydraulics and hydraulic measurement, with the development of the theory and practice involved.

Required of general engineering juniors. Three hours weekly during the third term.

G.E.52. Water Supply Engineering.

Required of general engineering seniors in Option A. Three hours weekly during the second term.

G.E.53. Water Supply, Sewerage and Sewage Disposal.

Required of general engineering seniors in Option A. Five hours weekly during the third term.

The course in hydraulics is followed by a fuller development of the subject as applied to rain-fall, run-off and storage of water, in relation both to water power and to potable water supplies. This course is accompanied by a study of the sanitary aspects of the subject of water supply and its preservation from contamination. An outline study is also made of pumping engines. The new laboratory affords opportunity for experimental work on flow of waters through orifices and pipes, and for tests of pumps, etc.

G.E.56. Kinematics. This course treats of the fundamentals of machine design and analysis of motion. Class room work is supplemented by machine drawing (G.E.17).

Required of general engineering juniors in Option A. Three hours weekly during the second term.

G.E.57. Thermodynamics. This course consists of lecture, recitation and exercise work in the principles of thermodynamics, the elements of the steam engine, valve diagrams and steam indicators.

Required of general engineering juniors. Two hours weekly during the second term.

G.E.58. Motors and Motive Power. Following the work in thermodynamics and hydraulics of the third term of the junior year an outline course in motors and motive power is given in the first and second terms of the senior year, comprising a study of the sources of demand and supply of power, steam-boilers, steam-engines, steam turbines, water-wheels and turbines, gas-engines, electric motors and transmission of power by shafting, belting, rope-driving, compressed air and electricity. The new laboratory

affords opportunity for efficiency tests of hydraulic and other forms of motors.

Required of general engineering seniors. Three hours weekly during the first and second terms.

G.E.59. Electrical Machinery. A three-hour course in the fundamental principles and practice of electrical generators, motors, transformers, transmission and instruments as given by the Electrical Engineering Department.

Required of general engineering juniors. Three hours weekly during the second term.

G.E.64. Outlines of Architecture. This course is a study of the historical development of architecture as exemplified in the different orders and styles.

Required of general engineering seniors. Two hours weekly during the third term.

Equipment

General Engineering Building

The new engineering building, the donation of Mr. Andrew Carnegie for the general engineering department, has recently been completed at a cost of \$100,000. It is a handsome structure of modern design, built of gray and buff pressed brick with gray stone trimmings.

The building is of fireproof construction throughout, the only wood used being in the doors, windows, and floor surface. It covers an area of 67 x 137 ft. and is three stories in height, with a basement above the ground level, making it practically four stories.

The entire east end of the basement, 50 x 62 ft. in area, will be used as a hydraulic laboratory. It is equipped with a steel tank 5 ft. in diameter and 52 ft. high, extending to the roof, with a tight cover so that it can be used as either a gravity or a pressure tank. The base of the tank will be provided with connections for standard orifices of various sizes and shapes. Connections will also be provided so that turbines and other forms of water motors can be driven by water from the tank under different heads. This room also contains a concrete canal

5 ft. deep, 9 ft. wide and about 20 ft. long, which will be extended out of doors to a total length of 100 ft. It will be arranged for the insertion of temporary dams at different points along its length, so that weirs may be used for the measurement of large flows of water. It is also to be used as a large measuring tank in connection with pump tests, and for various other hydraulic experimental purposes.

In the southwest corner of the basement is the cement laboratory, 46 x 26 ft. in area, equipped for the testing of cement, concrete, and similar structural materials.

The basement also contains a locker room, with 50 individual lockers for the use of students when working in the laboratories, and there is also a large and well-ventilated toilet room.

The northwest corner of the basement is taken up by a room for surveying instruments, with lockers, etc., for issuing equipment to field parties. Ready access is obtained to this room by an outside entrance at the west end of the basement corridor. This instrument room is connected by a lift with a large instrument laboratory on the first floor, which will also be furnished and used as a computing room by surveying classes.

On the first floor, besides the large computing room just mentioned, there is a large office and a room for the use of the engineering faculty.

In the southeast corner is an engineering museum, where models of bridges and other engineering structures will be placed, so as to be accessible for inspection.

The museum is connected by sliding doors with the engineering library and reading room. Here is placed the valuable Croes library, recently donated by E. B. Van Winkle, of the class of 1860, and also the large collection of engineering drawings, etc., belonging to the department.

The first floor also contains two recitation rooms, and one drawing room for the use of the class in engineering design.

On the second floor the north half is taken up by two large lecture or society rooms, each of which can be divided by folding partitions into two recitation rooms of the usual size. The south half of this floor is taken up by the applied mechanics lab-

oratory, 40 x 25 ft., and one large and one small recitation room. In the southeast corner is the sanitary engineering laboratory.

On the third floor are two large drawing rooms, each about 24 x 60 ft., and three smaller drawing rooms. All of these rooms are well lighted by windows and skylights. On this floor is also a good-sized blue-print room, a photographic room, and a dark room.

Each floor contains two or more small private offices for the use of instructors; and the entire plan of the building is admirably adapted to the needs of the department.

Instruments and Apparatus

The department is supplied with field instruments of the best description, comprising a large theodolite, suitable for refined geodetic operations, transits, surveyors' compasses, prismatic compasses, Burnier's compass, solar compass, Y levels, plane tables, sextants, mountain barometers, aneroid barometer and a marine chronometer.

The extensive private collection of models and instruments belonging to the late Professor Gillespie was purchased for the engineering school.

The collection of models in descriptive geometry and stereotomy is very complete. The following are some of the most important:

The Olivier Collection. This consists of about fifty models, representing the most important and complicated ruled surfaces of descriptive geometry, particularly warped or twisted surfaces. Their directrices are represented by brass bars, straight or curved, to which are attached silk threads representing the elements or successive positions of the generatrices of the surfaces. Each of these threads has a weight suspended by it, so as always to make it a straight line. These weights are contained in boxes sustaining the directrices and their standards. The bars are movable in various directions, carrying with them the threads, still stretched straight by the weights in every position they may take; so that the forms and natures of the surface which they constitute are continually changing, while they always remain

ruled surfaces. In this way a plane is transformed into a paraboloid, a cylinder into a hyperboloid, etc.

These models were invented by the late Theodore Olivier while professor of descriptive geometry at the Conservatoire des Arts et Métiers, in Paris. One set of them is now deposited there, and a second is in the Conservatory at Madrid. Copies of some of them are to be found in most of the polytechnic schools of Germany. The Union College set is the original collection of the inventor, having been made in part by his own hands, and, after his death, in 1853, retained by his widow till bought of her by Professor Gillespie, in 1855. It is more complete than that in the Paris Conservatoire. It may be worth noticing that the silver plates on the boxes, reading "*Inventé par Théodore Olivier,*" etc., were added by Madame Olivier, at her own expense, after the purchase, as a tribute to the memory of her husband, her own words being, "*Je tenais à ce que chaque instrument portât le nom du savant dont la réputation passera à la postérité.*"

Bardin's Models (Paris), in plaster, (seventy), of the intersections of prisms, pyramids, cones, etc.

Schroeder's Models (Darmstadt) of elementary descriptive geometry (twenty). The planes of projection are in wood, and the lines and surfaces in metal; models illustrating shades and shadows.

Stone Cutting Models (twenty), in plaster, selected from those of L'Ecole Polytechnique of Paris.

Professor Bardin's models (ten) in plaster, of oblique arches.

Groined and cloistered arch models (ten) in wood and plaster.

Models of structures in stone, consisting of bridges, culverts, etc.

Winding-stair models in wood and plaster. Full sized models of voussoirs and skew-backs of an oblique arch.

Models in Topography. French and German plaster models, giving all the different forms of ground, accompanied by topographical drawings, showing how to represent these forms by contour lines; hatchings and shades from vertical and oblique

light; models and maps in colored topography; a large model of Mount Cenis pass, showing the wagon road and contour lines.

Architectural Models. Models of the five orders of architecture from L'Ecole des Beaux Arts, Paris; portals; stairs; roofs; walls; buttresses; domes, etc.

Engineering Models. Schroeder's models of joints, brick bonds, etc.; spur wheels; bevel wheels; cranes; pile drivers; various forms of water-wheels; pumps; cylinders; valves; eccentrics; etc.; steam engines.

Casts of St. Venant's models showing the changes of form in bodies subjected to flexure. Full sized model of the liquid vein measured by Poncelet and Lesbros.

Models of bridges of various systems, comprising truss, suspension, tubular and arch bridges; Doynne's dynamometer bridge models showing, by means of dynamometer, strains at different points; models of roof trusses, arranged for using the dynamometer to show the different stresses.

Models of fortifications, illustrating Vauban's system; shot, shell, etc.

Models of culverts, piers, abutments, culvert heads, wing walls, rail sections, etc.

Maps, Drawings, Etc. This collection embraces a large number of maps, plates, profiles, topographical drawings and spherical projections; about fifty thousand engravings, lithographs, photographs and detail drawings of engineering and architectural structures; working drawings of machines, bridges, buildings, etc.

Physical Apparatus. To illustrate the lectures in physics, the college has an extensive collection of apparatus. This has been secured largely from foreign makers and includes special pieces of apparatus constructed under the direction of the late Professor Foster, besides sets of apparatus of standard patterns by Koenig, Duboscq, Ruhmkorff, and others.

In Mineralogy. The Wheatley collection contains nearly 4,000 specimens of minerals, the result of the labors of Charles M. Wheatley. All of these have been labeled according to the nomenclature and order adopted by Dana. They are without

exception, open at all times to the students. They furnish an admirable means of practical illustration in mineralogy. Among the rare and valuable specimens are those of anglesite, cerusite, mimetite and calcuprite, which in American specimens are equaled only by those in the British Museum. There are many fine specimens representing the noble metals from all parts of the world. There are few known species of minerals of which the collection does not contain some specimens.

In addition to this there is a large series of unlabeled specimens for crystallographic and blow-pipe examination.

In Metallurgy. The college possesses a suite of ores of the useful metals, comprising over 1,000 specimens. These have been arranged to illustrate their mode of occurrence and geographical distribution. In addition are the fluxes, fuels, etc., used in obtaining the metals from the ores, together with the slags and metals themselves in various forms. There is a large number of models and drawings of stacks, furnaces, etc.: also suites of specimens of wood, charcoal, mineral coal, peat, etc., for physical inspection; also specimens of most of the useful alloys.

In Chemistry. The chemical laboratory is furnished with tile-top desks and lockers, and all the modern apparatus necessary for work in general chemistry and qualitative and quantitative analysis. Ample hoods occupy one side of the laboratory, where the student may work with the disagreeable and poisonous gases. In the private laboratory of the professor of chemistry provision is made for any students who may desire to pursue advanced courses, either in volumetric analysis, water and milk analysis, organic chemistry, or any special work in connection with courses of other departments.

A large number of specimens of the materials used in the manufacture of the mineral and some of the organic acids; the crude products themselves and the materials used in the manufacture of the alkalis, soaps, matches, black lead, candles, petroleum products; linseed, olive, castor, cottonseed and other oils; paper, porcelain, glass, fire and building brick, mortar and cements, beet and cane sugar, white lead and other paints, etc., etc., form a part of the permanent collection of the department.

SANITARY ENGINEERING DEPARTMENT

General Considerations. The extensive development of sanitary biology during recent years and the establishment on a firm, scientific basis of the germ-theory of disease have laid a secure foundation for the important specialty of sanitary engineering. Already the practical application of the principles in many lines of public utility, as well as in medicine and surgery, has resulted in a very marked decrease in the annual death rate. The most fruitful line of application of this recent and useful knowledge lies in the intelligent design, construction and operation of municipal public works and of systems of water supply, sewerage, and drainage, heating and ventilation of private residences, schools, hotels, hospitals and other public institutions and buildings.

General Scheme of the Course. The course in sanitary engineering differs from the general engineering course by omitting astronomical surveying, geodesy and railroad construction, and substituting therefor sanitary biology, heating and ventilation, house drainage and plumbing, sanitary codes and laws, and an increase in the amount of chemistry and chemical laboratory work.

Sanitary Conditions of Buildings. In the first and third term senior, respectively, are given courses in heating and ventilation and in house drainage and plumbing. The latter course gives special attention to the matter of water supply and of the removal of wastes from buildings in all situations, from the isolated country house to that in a thoroughly drained city.

Sewerage and Drainage. The study of the principles and practice of sewerage and sewage disposals is given during the last term of the senior year. The fundamental sanitary and constructive principles are developed and a comparative study of the various systems as well as of the details of construction and maintenance receives careful attention. A course of lectures in the third term senior presents the principles upon which the laws touching the subject of the public health are based and the outlying principles which should govern the preparation of sanitary codes and regulations.

Graduate Course

Leading to the Degree of M. C. E.

This course of one year's graduate study, consisting of lectures, laboratory and research work is open to graduates of the general or the sanitary engineering course of Union College or of any other institution of a standing recognized by the faculty.

Admission

The entrance requirements are given in detail on pages 30-41. Correspondence regarding admission to the undergraduate courses should be addressed to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* Correspondence regarding admission to the graduate course in civil engineering may be addressed to

DR. OLIN H. LANDRETH

Professor of Civil Engineering

Schenectady, New York

ELECTRICAL ENGINEERING DEPARTMENT

Purpose and Methods. A course of instruction in electrical engineering was introduced in 1895, and in 1902 was re-organized and made into a separate department of the engineering school under the direction of Professor Charles P. Steinmetz, consulting engineer of the General Electric Company.

The course of studies offered by the department of electrical engineering aims at a thorough and broad scientific education of the prospective engineer, rather than the specific training of a specialist. The instruction, therefore, consists of three classes of studies. The general culture studies furnish such training as is now considered essential for every educated man, as languages, literature, history, etc. Such instruction extends over a large part of the first two years, and is then followed by a broad and general technical education, giving the student the fundamental principles and their application to all branches of engineering. Ultimately follows the specific instruction in electrical engineering, which, while it enables the student, after graduation, to enter the field of electrical engineering practice in the manufacturing or operating company or consulting engineer's office in a sub-

ordinate capacity only, has given him all the necessary requirements to gather in a few years' practice the knowledge needed for independent work of greater magnitude.

The instruction especially aims at a thorough understanding of the fundamental principles rather than a memorizing of numerous facts — that is, aims at quality, and not quantity — and as far as possible in all engineering instruction the subject is brought before the student in three different ways; by a theoretical lecture course with recitations, practical instruction in the electrical laboratory paralleling the lecture course, and, following this, the application of the knowledge gained in lecture courses and laboratory to calculation and design in the drafting room. Finally, more independent work on the solution of engineering problems is undertaken by the students. These problems invariably require some research work; the systematic tabulation of the results with original conclusions constitutes the graduating theses. Throughout the technical course, by work in the laboratory, some familiarity with the apparatus is given to the students before the technical side is taken up in the lecture course, so that when approaching the theoretical studies of electrical phenomena or apparatus the student is already able to appreciate the practical value and importance of the subject with which the theoretical investigations deal.

Through the active interest which the General Electric Company takes in technical education, an arrangement has been effected between the college authorities and the officials of the company by which the students in the junior and senior classes are admitted to the company's works at appointed times, under the direction of their instructor, with the privilege and opportunity of studying and inspecting the plant and operations and of being regularly instructed therein. The work has been systematically arranged, and is given simultaneously with the corresponding class and laboratory work, to which it forms an important and valuable adjunct.

List of Studies

In the following list of studies, only those subjects of the electrical engineering course which are not required in the other

courses are described in detail. All the culture studies and most of the general engineering and scientific studies are pursued in common with the students of other engineering branches. Beginning with the junior year, however, the courses diverge. The electrical engineers take up a number of mechanical engineering subjects and continue them throughout the junior and first part of the senior year. In fact, during the junior year the mechanical engineering work may be considered as constituting the major subject, though a considerable amount of time is also devoted to electrical engineering.

Studies also required in other courses are:

American History	Page 57
Rhetoric.	Page 52
Descriptive Chemistry	Page 66
Physical Chemistry	Page 118
Logic.	Page 58
Economics.	Page 60
Engineering Law and Procedure.....	Page 100
Engineering Mathematics	Page 92

The mechanical engineering subjects not previously described are:

M.E.1. Hydraulics. A study of the principles of hydraulics, hydraulic machinery and the elements of turbine design.

Required of electrical engineering juniors. Three hours weekly during the first and second terms.

M.E.2. Heat Engines. Thermodynamics, the theory of the steam engine, the steam turbine, internal combustion engines and design.

Required of electrical engineering juniors. Three hours weekly during the second and third terms.

M.E.3. Applied Mechanics. The applications of the principles of theoretical mechanics are studied with particular reference to the changes in the size and shape of bodies. The consideration of stresses and deformations in bodies; the theory of the various types of beams, columns, shafts; and the elastic properties of materials, etc., are taken up in detail.

Required of electrical engineering juniors. Four hours weekly during the first term.

Other general subjects given only to electrical engineering students are:

C.E.1. Elements of Civil Engineering. The work and methods of the civil engineer. This course is given to broaden the ideas of the student, thus enabling the electrical engineer to value properly the labors of his colleagues in this allied department of the profession of the junior year.

Required of electrical engineering juniors. Two hours weekly during the third term.

Seminar. In mathematical seminar practical engineering problems are proposed, in the solution of which it is necessary to utilize the field of mathematics previously covered. Mechanics, thermodynamics, hydraulics, electrical phenomena of permanent or transient form — all combining to make an inexhaustible field from which graded problems are selected. This is a practical application of algebra, trigonometry, calculus, etc.

Required of electrical engineering juniors. One hour weekly throughout the year.

The electrical engineering studies include the following:

E.E.1. Engineering Mathematics. One lecture per week is given in the third term of the junior year in preparation for the more advanced work given by Dr. Steinmetz in his course for the senior year.

Required of electrical engineering juniors. One hour weekly during the third term.

E.E.2. Direct Current Circuits and Apparatus. Students in electrical engineering devote a considerable part of the junior year to the study of the fundamental principles of the subject. Direct current phenomena are studied first, as this part of the subject is somewhat simpler and is readily brought within the grasp of the average student. This work includes the theory and practice of direct current generators and motors and auxiliary apparatus, taking into account also the principles of design.

Required of electrical engineering juniors. Three hours weekly during the second and third terms.

Alternating Current Circuits and Apparatus.

E.E.3. Junior. Fundamentals of alternating current circuits and machines. Many problems are assigned in order to make the work specific and concrete.

Required of electrical engineering juniors. Three hours weekly during the second and third terms.

E.E.4. Senior. A continuation of E.E.3, becoming more advanced. Analyses and discussions of generators, synchronous motors, transformers, induction motors, series motors, converters, higher harmonies, etc.

Required of electrical engineering seniors. Three hours weekly during the first and second terms.

Electrical Laboratory

E.E.5. Direct Current Laboratory. The work under this head is parallel with E.E.2, and includes all standard tests of direct current machines, and is supplemented by numerous experiments arraigned with due regard to their general importance and scientific value. The machines with which the student has become more or less familiar in class work are here examined in detail and careful records made of efficiency, regulation, internal characteristics, commutation under varying loads, etc.

Required of electrical engineering juniors. Two hours weekly during the first and second terms.

E.E.6. Alternating Current, Junior. The work done here in the junior year consists of an extensive series of experiments corroborating and explaining the theories of the lecture room. The exercises consist in investigation of voltage and current conditions on a variety of combinations of resistance, inductance and capacity in series and in multiple, the exploring of field flux and wave shapes of alternators, and the effect of inductance and capacity on wave shape, the use and calibration of meters, the potentiometer, the photometer, etc. Upon entering the senior year the student is thus equipped with the broad foundation in the underlying principles of electrical engineering, which is abso-

lutely essential to a comprehensive study of the more intricate and special departments of the subject.

Required of electrical engineering juniors. Two hours weekly during the third term.

E.E.7. Alternating Current, Senior. In this course complete tests are made on the apparatus studied, and the characteristics of the various machines are determined. The laboratory work deals with the transformer: ratio, impedance and core loss characteristic, regulation and heat runs, the synchronous motor and generator: amplitude and phase displacement of the various phases of multiphase machines, no load and load saturation, phase characteristics, pulsation, regulation and compounding curves, starting test, etc., the induction motor: determination and plotting of curves for power factor, speed, slip, torque, efficiency as function of speed, starting tests on motors with squirrel cage armatures and compensator, also on machines with variable rotor resistance, impedance and core loss curves and maximum output determination, the single phase induction motor, the use of the oscillograph.

Required of electrical engineering seniors. Two hours weekly during the first and second terms.

Electrical Apparatus Design

E.E.8. Direct Current Machines. When E.E.2 has been finished each student is directed to design a specified machine and is required to do this work in class and without other aid than that given by the instructor. Complete calculations, with curves, where necessary, and working drawings of the machine designed, are required, and credit is given for accuracy, originality and neatness.

Required of electrical engineering juniors. Three hours weekly during the third term.

E.E.9. Alternating Current Machines. This subject is a continuation of the machine design begun in the junior year, and the two are handled in much the same manner. Transformers, induction motors, alternating current generators, etc., are calculated and their layouts completed. As each type of machine is

taken up, fundamental lectures are first given, outlining the requirements for successful construction and operation and supplying data for all computations. Individual work is then assigned to each student and is carried out under the personal supervision of the instructor.

Required of electrical engineering seniors. Two hours weekly throughout the year.

E.E.11. Electric Lighting. Wiring, systems of distribution and their comparative economy and efficiency, standard types of incandescent lamps and arc lamps, recent developments in these lines, vacuum tube lamps, the arc, photometry, illuminating engineering, etc.

Required of electrical engineering juniors. Three hours weekly during the third term.

E.E.12. Technical Literature. In this course, students are required to report in class upon current publications assigned to them, reviewing briefly the best articles found. There are also included library references to biographical sketches and research works of eminent men.

It is intended by this means that the student shall become broadly familiar with the sources of the best and the most recent technical literature; that he shall learn how to keep abreast of the times; that he shall acquaint himself with channels through which he may obtain information upon any particular subjects; that he shall be able to summarize any article he reads, picking out its salient points; that he shall receive practice in expressing his thoughts clearly and concisely upon important subjects.

Required of electrical engineering seniors. Two hours weekly during the third term.

E.E.14. Electric Transmission. The subjects discussed here are long distance transmission, line construction, systems, grouping of machines, control of phase, methods of compensation, maximum power supplied over line, line efficiency, copper efficiency, distributed capacity, inductance, resistance, leakage and natural period of transmission line, surging, resonance due to higher harmonics, balanced and unbalanced polyphase systems, transformations, lightning, lightning protection. The subject is

subdivided in such a way that it may be considered that the first term covers the power plant and generation, the second term covers transmission and distribution, and the third term is devoted, mainly, to design and calculations for a power system.

Required of electrical engineering seniors. Three hours weekly throughout the year.

E.E.15. Electric Railways. The subject of electric railway engineering is treated in three sections: 1. From the point of view of the consulting engineer who, being retained by the promoters of a proposed railway, investigates the field and territory of the new line, advises as to probable earnings of line, lays route, prepares plans and specifications and has charge of construction. 2. From the point of view of the operating engineers who have charge of rolling stock and maintenance of service on the line. This includes a complete discussion of the equipment of modern electric railways, the various systems in vogue, sub-station equipment and in general the operation of electric railways. 3. The problem of the electric railway as it is presented to the designing electrical engineer is discussed. About half of the time devoted to railways is reserved for this section of the work. The questions of predetermination of railway motors from service characteristics, of train resistance and other quantities affecting the operation of electric trains are treated and the various alternating current railway motors which are being developed are discussed.

Required of electrical engineering seniors. Three hours weekly during the second term.

E.E.17. Electrical Engineering Practice. This course of lectures is designed to put the student into touch with the most recent developments of advanced engineering practice. It emphasizes the fact that an engineer must be well equipped and resourceful in order successfully to attack new problems. It is an outgrowth of what was formerly known as a lecture course by specialists.

Required of electrical engineering seniors. Two hours weekly during the second and third terms.

Among those who have consented to give lectures in this course for the current year are:

E. B. MERRIAM

C. M. DAVIS

H. M. HOBART

E. E. F. CREIGHTON

J. B. TAYLOR

F. W. PEEK, JR

E.E.18. Electrical Engineering Theory. Beneath the whole superstructure of electrical engineering is one broad base. This foundation is the same for alternating currents, or direct currents; motors or generators; power circuits or telephone circuits; local distribution or long-distance transmission; permanent phenomena or transient phenomena. These courses of lectures lead to a better conception of relations existing among the seemingly widely separated branches of the applied science and furnish foundation and incentive for subsequent advanced work.

Required of electrical engineering seniors. Two hours weekly throughout the year.

E.E.19. Thesis. (See page 95.) The thesis subject chosen early in the year becomes a topic for report each term. Progress during the first and second terms is outlined and described in technical essays. During the third term considerable time is given to the development and completion of the investigation and a final report is made upon it. Independent work and originality are encouraged, and, although the work is supervised, this oversight is accomplished with as little intrusion as may be consistent with satisfactory results.

E.E.20. Physical Chemistry. Theory of the atom, theory of gases, liquids, and solids, theory of solutions, osmotic pressure, dissociation, concentrations, industrial applications of electrochemistry, electric furnaces, etc.

Required of electrical engineering juniors. Three hours weekly during the second term.

Lectures by Engineers. To juniors and seniors of this course is available the notable privilege of becoming, upon the payment of a nominal fee, members of the Schenectady section of the American Institute of Electrical Engineers. Throughout the winter occur, before this section, a succession of lectures probably

without an equal except before the national body itself. The value of this course cannot be overestimated. During the past season there was held under the auspices of the Schenectady and Pittsfield sections the midwinter convention of the institute at which were given about eighteen papers upon important electrical subjects. The General Electric Company's plants at each of these places were thrown open for inspection trips and special exhibitions were arranged.

A representative list of the speakers is added:

GANO DUNN	RALPH W. POPE
Prof. E. J. BERG	W. L. R. EMMETT
Prof. A. G. WEBSTER	DR. W. R. WHITNEY
E. B. MERRIAM	D. B. RUSHMORE
W. B. POTTER	C. I. BURKHOLDER
Prof. W. S. FRANKLIN	C. F. SCOTT
W. S. ANDREWS	DR. ELIHU THOMSON
Prof. C. P. STEINMETZ	E. W. RICE, JR.
GIUSEPPE FACCIOLI	Prof. E. E. F. CREIGHTON
W. S. MOODY	A. B. HENDRICKS

Electrical Laboratory Equipment

The electrical engineering laboratory is a commodious, well-lighted building, and permits the arrangement and grouping of the machines in a flexible relation to each other.

The ground plan of the buildings is T-shaped. The upper bar of the T was two stories. The lower floor is devoted to three laboratory rooms, the largest of which is 101 ft. by 35 ft. outside dimensions. This is the main laboratory and extends from front to rear of the building.

A light, well-ventilated drafting room occupies the major portion of the second floor, being 73 ft. by 27 ft. in dimensions.

The purpose of a college laboratory of electrical engineering is two-fold: To familiarize the student with the shape, appearance, relative proportions and construction of modern electrical apparatus, and to instruct him in the handling, assembling, testing and operation of electrical apparatus under normal and abnormal conditions.

Because of the great variety and large size of modern electrical apparatus, the former purpose can be fulfilled very incompletely only, even in the largest and best equipped college laboratories. Through the favorable disposition of the General Electric Company, by giving the electrical engineering students of Union College free access to the works and testing rooms, this purpose is admirably fulfilled here, and by frequent and regular inspection trips to the works and testing department of the General Electric Company under the direction of the college instructors, which trips constitute an integral part of the laboratory instruction, the students gain a very intimate knowledge of modern electrical apparatus of all types and sizes, not only when assembled and in operation and test, but also during their construction in the shops.

In equipping the college laboratory special consideration was therefore given to the selection only of such representative types of apparatus as can be handled, operated and tested by the students, and machines are of a size sufficiently large to correspond to modern practice, but not so large as to make the operation under abnormal conditions—that is, under conditions which as a rule are specially instructive—unsafe for the apparatus. All such machinery as the student can not be permitted to handle freely was excluded from the equipment.

Power is supplied from the following sources: A direct connected unit consisting of a Westinghouse gas engine and a direct current generator; a motor-generator set consisting of a 55-h.p. direct current motor direct connected to a 30 kw., 120-240 volt, three-phase, 60 cycle alternator; a motor-generator set consisting of a 17.5 kw. direct current generator direct connected to a three-phase 220-volt induction motor; connection with the 550-volt direct current trolley circuit of the Schenectady Railway Company; connection with a three-phase 2300-volt power circuit of the Schenectady Illuminating Company. In the latter case voltage is reduced by banks of step-down transformers, so that the students can handle the safe low-tension circuits only.

A secondary supply is also secured by means of a group of lead plate storage batteries charged by a mercury arc rectifier upon the alternating current power circuit.

A very large number of various sizes of transformers is provided to give the students practical experience in connecting transformers for different ratios and for transformation between three-phase, quarter-phase, six-phase, etc., systems. The equipment further contains three-phase, quarter-phase and six-phase alternators and synchronous motors, the two characteristic types of induction motors, three and six-phase rotary converters, bipolar and multipolar generators, commutating-pole motors, and numerous smaller induction motors, converters and direct current motors and generators of different types. A constant current arc machine, with different types of arc lamps and a constant alternating current transformer, with series arc lamps, testing tables, switchboards, oilswitches, and numerous instruments of the indicating and the integrating type, are also provided for efficient instruction.

Among the recent additions to the laboratory are an oscillograph and a potentiometer. The former is the standard three galvanometer type, manufactured by the General Electric Company, with photographic and tracing attachments. With this instrument wave forms may be traced or photographically recorded and transient phenomena of the electric circuit studied and investigated. The potentiometer is an absolute standard for the calibration of electrical instruments and is similar to that used by the Public Service Commission of New York State.

Inspection Trips

It is desirable that each student in the electrical engineering courses participate at least once during his college life in an extended trip of inspection of engineering activities. Such trips are, therefore, arranged at a low cost to each man and vary from year to year. For the past two years the excursions have been to New York City and have covered two or three days with an average expenditure of about \$12.00 per capita. It is the policy of the department to continue to arrange such trips and to conduct them when sufficiently representative groups of men can attend.

Graduate Course

Leading to the Degree of M. E. E.

To students desiring to continue their studies a short time beyond the four-year course, a graduate course of one year is offered in which, besides instruction in higher branches of electrical engineering, there will be occasion to carry out original investigations under the supervision and with the assistance of specialists prominent in electrical engineering practice on subjects closely connected with the most recent advance of electrical engineering. In return for the assistance offered to the graduate students in their research work such students may be required to devote a small part of their time to assisting the regular college instructors in laboratory instruction. This course leads to the degree of Master of Electrical Engineering, and is open to graduates of Union College or of other institutions approved by the faculty. The work is to be done in residence and all options described below fall within this requirement.

The options open to Union College graduates are:

1. Three terms' work in residence.

For this course registration is required at the college office for the three terms.

2. One-half year of engineering work with General Electric Company, supervised by the electrical engineering department of the college, and two terms of college work in residence.

For this course registration is required with the electrical engineering department before entering upon any accredited work, and at the college office for the two terms preceding the granting of the degree.

3. At least one and one-half years of engineering work with the General Electric Company, supervised by the electrical engineering department of the college, and a thesis representing a distinct advance in the science.

For this course registration is required with the electrical engineering department eighteen months before granting of the degree and at the college office for one term preceding the granting of the degree.

Course open to graduates of other colleges :

Graduates of other colleges must register at the college office for the full year preceding the granting of the degree. The course may be arranged, at the discretion of the department, to include a certain amount of work with the General Electric Company.

Some of the courses offered to the graduate students are as follows, although not all of these subjects are given each year :

Psychology	Sociology
Philosophy	Advanced calculus
Geology	Differential equations
Economics	Long distance transmission
Design and control of electric power systems of very great magnitude	
Electric railway and traction, continued	
Modern theory of electrical engineering, continued	
Oscillating currents and high frequency phenomena	
Transient phenomena, lightning and lightning protection	
Wave transmission, with special application of telephony	
Scientific foundations of electrical engineering	
Electro-chemistry	
Light and illumination	
Electrical engineering apparatus	
Steam turbines	
Storage batteries	
Telephone engineering	
Laboratory	
Research work	

Some of the lectures given by Professor Charles P. Steinmetz to graduate students are as follows :

Review : The electric, magnetic and dielectric circuit. Resistance, inductance, capacity and wireless telegraphy.

The law of electromagnetic induction ; electric apparatus and machines ;

The characteristic curves of electrical apparatus, machines and circuits. Magnetic characteristic : saturation and excitation curve.

Load characteristic: regulation curve, field characteristic compounding curve. Phase characteristic of alternating current apparatus; Efficiency, no load and load losses.

Commutating machines: direct current generators and motors.

Synchronous machines: alternators and synchronous motors and converters.

Induction machines: induction motors and generators, single phase and polyphase repulsion motors and generators.

Rectifying machines: the arc machine, constant potential and constant current rectification, arc rectifiers and electrolytic rectifiers.

Transformers and reactors: constant potential and constant current.

Meters: indicating, integrating and recording.

Transient phenomena: starting and building up of direct current generators: effect of field inductance and fluctuating load: starting of synchronous machines.

Starting of transformers, of inductive circuits, of circuits containing inductance and capacity, transmission lines, short circuit phenomena of circuits containing inductance and capacity. Transmission lines, short circuit oscillations.

Short circuit current of direct and alternating current generators.

Hunting or surging of synchronous machines, motors and converters. Hunting or surging of induction machines, of direct current motors and generators.

Alternating current series motors.

In addition to this a course is given on the design of electrical apparatus, in which the students carry out the design of a number of typical machines and apparatus under the personal direction of Professor Steinmetz. The course includes the discussion of all the elements entering into the practical design and construction.

Graduate Course

Leading to the Degree of Ph. D.

The degree of Doctor of Philosophy is not given on the completion of a certain amount of work or the study of stated sub-

jects for a definite period of time, but is intended to be a mark of breadth of training and high attainment. It will be conferred upon the candidate upon the satisfactory fulfillment of the following conditions:

1. The applicant for admission to this course must present a Master's degree received in recognition of work of a nature indicating preparation for advanced electrical study.

2. The candidate must spend at least two years in resident work under direction of the faculty.

3. The major subject of study must be electrical science.

4. Two minor subjects of study must be pursued, one of which is to be philosophy.

5. At the completion of the course, and two months before the conferring of the degree, a suitable thesis must be presented to the head of the electrical engineering department, representing original work and indicating strength and ability in independent investigation.

6. Fifty printed and bound copies of the thesis must be deposited in the college library before the successful candidate may receive the diploma for his degree. The degree may be conferred, however, before such copies are deposited, upon the presentation to the treasurer of proper security for their provision. In this case, a bound typewritten copy shall be placed in the library previous to the conferring of the degree.

Admission

The entrance requirements are given in detail on pages 30-41. Correspondence regarding admission to the undergraduate courses should be addressed to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* Correspondence regarding admission to the graduate courses in electrical engineering may be addressed to

DR. CHARLES P. STEINMETZ
Professor of Electrical Engineering
Schenectady, N. Y.

CURRICULA OF ENGINEERING COURSES

The numeral after a subject refers to the course as described in the departmental statement; the number in parenthesis refers to the page where the statement is given.

Courses Leading to Degree of B.E.

Freshman Year, all courses

First Term

French 1 or 1a	(49)	3 hours
German 1a or 1	(46)	3 hours
Rhetoric 1	(52)	2 hours
Freehand Drawing GE11	(93)	3 hours
Algebra GE1	(91)	4 hours
Physiology	(69)	1 hour
Trigonometry GE2	(91)	2 hours
Lectures GE61	(94)	

Total 18 hours

Second Term

French 1 or 1a	(49)	3 hours
German 1a or 1	(46)	3 hours
Rhetoric 1	(52)	2 hours
Analytic Geometry GE3	(92)	4 hours
Mensuration GE21	(94)	2 hours
Mechanical Drawing GE12	(93)	3 hours
Gymnastics	(94)	1 hour
Lectures GE61	(94)	

Total 18 hours

Third Term

French 1 or 1a	(49)	3 hours
German 1a or 1	(46)	3 hours
Rhetoric 1	(52)	2 hours
Calculus GE4	(92)	3 hours
Analytic Geometry GE3	(92)	3 hours
Surveying and Plotting GE22	(94)	2 hours
Physiology	(69)	1 hour
Commencement Term Work GE63	(95)	

Total 17 hours

Sophomore Year, all courses

First Term

Rhetoric 10	(55)	1 hour
Calculus GE5	(92)	3 hours
Mechanics GE6	(92)	3 hours

Physics 2.....	(63)	3 hours
Chemistry 1.....	(65)	3 hours
English Literature 3.....	(53)	2 hours
Hygiene.....	(69)	1 hour
Topographical Surveying GE23	(94)	2 hours
Summer Vacation Work GE62	(95)	
Total		18 hours

Second Term

Rhetoric 10.....	(55)	1 hour
Calculus GE5.....	(92)	3 hours
Mechanics GE6	(92)	2 hours
Physics 2.....	(63)	4 hours
Chemistry 1.....	(65)	4 hours
English Literature 3.....	(53)	2 hours
Descriptive Geometry GE13	(93)	3 hours
Total		19 hours

Third Term

Rhetoric 10.....	(55)	1 hour
Calculus GE5.....	(92)	2 hours
Mechanics GE6	(92)	2 hours
Physics 2.....	(63)	4 hours
Chemistry 1.....	(65)	4 hours
English Literature 3.....	(53)	2 hours
Descriptive Geometry; shades and shadows GE14.....	(93)	3 hours
Commencement Term Work GE63	(95)	
Total		18 hours

Junior Year, General Engineering, Option A*First Term*

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Applied Mechanics GE31.....	(91)	4 hours
Chemical Laboratory 2.....	(66)	4 hours
Highways and Pavements GE38.....	(100)	4 hours
Topographical Surveying and Mapping GE24.....	(97)	3 hours
Summer Vacation Work GE62	(95)	
Total		18 hours

Second Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Mechanics of Materials and Eng. Laboratory GE32....	(98)	5 hours
Kinematics and Machine Drawing GE56.17.....	(102,97)	3 hours
Electrical Machines GE59	(103)	3 hours
Thermodynamics GE57	(102)	2 hours
Natural Perspective GE15	(97)	1 hour
Total		17 hours

Third Term

Rhetoric 9.....	(55)	1 hour
History 2.....	(57)	2 hours
Stresses GE33.....	(99)	4 hours
Hydraulics GE51.....	(101)	3 hours
Route Surveying GE25.....	(98)	3 hours
Spherical Trigonometry and Astronomy GE9.....	(97)	3 hours
Stereotomy GE16.....	(97)	2 hours
Inspection Trips		
Commencement Term Work GE63	(95)	
		Total 18 hours

Junior Year, General Engineering, Option B*First Term*

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
History 1.....	(56)	2 hours
Applied Mechanics GE31	(98)	4 hours
Highways and Pavements GE38.....	(100)	4 hours
Chemical Laboratory 2.....	(66)	3 hours
Topographical Surveying and Mapping GE24	(97)	3 hours
Summer Vacation Work GE62	(95)	
		Total 19 hours

Second Term

Rhetoric 9.....	(55)	1 hour
History 2.....	(57)	2 hours
History 1.....	(56)	2 hours
Elements of Law GE42.....	(101)	3 hours
Mechanics of Materials and Eng. Laboratory GE32.....	(98)	5 hours
Electrical Machinery GE59	(103)	3 hours
Thermodynamics GE57	(102)	2 hours
		Total 18 hours

Third Term

Rhetoric 9.....	(55)	1 hour
History 2.....	(57)	2 hours
History 1.....	(56)	2 hours
Law of Property and Contract GE43.....	(101)	3 hours
Stresses GE33.....	(99)	4 hours
Route Surveying GE25	(98)	3 hours
Hydraulics GE51.....	(101)	3 hours
Inspection Trips		
Commencement Term Work GE63	(95)	
		Total 18 hours

Junior Year, Sanitary Engineering

First Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Applied Mechanics GE31.....	(98)	4 hours
Chemical Laboratory 2.....	(66)	4 hours
Highways and Pavements GE38.....	(100)	4 hours
Topographical Surveying and Mapping GE24.....	(97)	3 hours
Summer Vacation Work GE62.....	(65)	
		Total 18 hours

Second Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	1 hour
Mechanics of Materials and Eng. Laboratory GE32...	(98)	5 hours
Kinematics and Machine Drawing GE56.17.....	(102,97)	3 hours
Electrical Machinery GE59.....	(103)	3 hours
Thermodynamics GE57.....	(102)	2 hours
Natural Perspective GE15.....	(97)	1 hour
		Total 16 hours

Third Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Stresses GE33.....	(99)	4 hours
Hydraulics GE51.....	(101)	3 hours
Route Surveying GE25.....	(98)	3 hours
Spherical Trigonometry and Astronomy GE9.....	(97)	3 hours
Stereotomy GE16.....	(97)	2 hours
Inspection Trips		
Commencement Term Work GE63.....	(95)	
		Total 18 hours

Junior Year, Electrical Engineering

First Term

Rhetoric 11.....	(55)	1 hour
Seminar.....	(113)	1 hour
History 2.....	(57)	2 hours
Electrical Laboratory EE5.....	(114)	2 hours
Direct Current Circuits and Apparatus EE2.....	(113)	3 hours
Hydraulics ME1.....	(112)	3 hours
Applied Mechanics ME3.....	(112)	4 hours
Descriptive Chemistry 2.....	(66)	4 hours
Summer Vacation Work GE62.....	(95)	
		Total 20 hours

Second Term

Rhetoric 11.....	(55)	1 hour
Seminar.....	(113)	1 hour
History 2.....	(57)	2 hours
Electrical Laboratory EE5.....	(114)	2 hours
Direct Current Circuits and Apparatus EE2.....	(113)	3 hours
Hydraulics ME1.....	(112)	2 hours
Heat Engines ME2.....	(112)	3 hours
Alternating Current Circuits and Apparatus EE3.....	(114)	3 hours
Physical Chemistry EE20.....	(118)	3 hours
Total		20 hours

Third Term

Rhetoric 11.....	(55)	1 hour
Seminar.....	(113)	1 hour
History 2.....	(57)	2 hours
Electrical Laboratory EE6.....	(114)	2 hours
Mathematics EE1.....	(113)	1 hour
Electrical Apparatus Design EE8.....	(115)	3 hours
Elements of Civil Engineering CE1.....	(113)	2 hours
Heat Engines ME2.....	(112)	2 hours
Alternating Current Circuits and Apparatus EE3.....	(114)	3 hours
Electric Lighting EE11.....	(116)	3 hours
Total		20 hours

Senior Year, General Engineering, Option A*First Term*

Economics 3.....	(60)	3 hours
Railroad and Trolley Road Construction GE37.....	(100)	5 hours
Engineering Stresses GE34.....	(99)	4 hours
Economic Geology 6.....	(68)	2 hours
Motors and Motive Power GE58.....	(102)	2 hours
Engineering Mathematics GE7.....	(92)	2 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		
Summer Vacation Work GE62.....	(95)	
		Total 18 hours

Second Term

Sanitary Biology 3.....	(67)	2 hours
Method of Least Squares GE8.....	(97)	3 hours
Engineering Design and Construction GE35.....	(99)	4 hours
Water Supply Engineering GE52.....	(102)	3 hours
Motors and Motive Power GE58.....	(102)	3 hours
Engineering Mathematics GE7.....	(92)	2 hours

Building Construction GE36	(99)	2 hours
One Literary Essay		
One Technical Essay		

Total 19 hours

Third Term

Engineering Law and Procedure GE41	(100)	3 hours
Geodesy and Field Astronomy GE26	(98)	3 hours
Outlines of Architecture GE64	(103)	2 hours
Engineering Design and Construction GE35	(99)	4 hours
Water Supply, Sewerage, and Sewage Disposal GE53(102)		5 hours
Thesis		

Total 17 hours

Senior Year, General Engineering, Option B

First Term

Economics 1	(60)	3 hours
Comparative Politics 4	(57)	3 hours
Principles and Laws of Corporations GE44	(101)	3 hours
Motors and Motive Power GE58	(102)	2 hours
Engineering Stresses GE34	(99)	4 hours
Engineering Mathematics GE7	(92)	2 hours
Economic Geology 6	(68)	2 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		
Summer Vacation Work GE62	(95)	

Total 19 hours

Second Term

Economics 2	(60)	3 hours
Comparative Politics 4	(57)	3 hours
Principles of Finance and Financial Operations GE46	(101)	2 hours
Motors and Motive Power GE58	(102)	3 hours
Engineering Mathematics GE7	(92)	2 hours
Engineering Design and Construction GE35	(99)	4 hours
Building Construction GE36	(99)	2 hours
One Literary Essay		
One Technical Essay		

Total 19 hours

Third Term

Economics 2	(60)	3 hours
International Law 4	(57)	3 hours
Principles of Administration GE47	(101)	3 hours
Engineering Design and Construction GE35	(99)	4 hours
Outlines of Architecture GE64	(103)	2 hours
Principles of Accounting GE48	(101)	3 hours
Thesis		

Total 18 hours

Senior Year, Sanitary Engineering

First Term

Motors and Motive Power GE58.....	(102)	2 hours
Engineering Stresses GE34.....	(99)	4 hours
Heating and Ventilation.....	(109)	3 hours
Chemical Laboratory 5.....	(66)	3 hours
Economic Geology 6.....	(68)	2 hours
Economics 1.....	(60)	3 hours
Engineering Mathematics GE7.....	(92)	2 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		
Summer Vacation Work GE62.....	(95)	_____
	Total	19 hours

Second Term

Motors and Motive Power GE58.....	(102)	3 hours
Engineering Design and Construction GE35.....	(99)	4 hours
Water Supply Engineering GE52.....	(102)	3 hours
Chemical Laboratory 5.....	(66)	2 hours
Sanitary Biology 3.....	(67)	2 hours
Engineering Mathematics GE7.....	(92)	2 hours
Electives.....	(81)	3 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		

Total 19 hours

Third Term

Engineering Law and Procedure GE41.....	(100)	3 hours
Engineering Design and Construction GE35.....	(99)	4 hours
Sewerage and Sewage Disposal GE53.....	(102)	5 hours
House Draining and Plumbing.....	(109)	1 hour
Sanitary Codes and Laws.....	(109)	1 hour
Electives.....	(81)	2 hours
Thesis		

Total 16 hours

Senior Year, Electrical Engineering

First Term

Economics 3.....	(60)	3 hours
Logic 1.....	(58)	3 hours
Electrical Laboratory EE7.....	(115)	2 hours
Electrical Engineering Theory EE18.....	(118)	2 hours
Electrical Transmission and Generation EE14.....	(116)	3 hours
Electrical Apparatus Design EE9.....	(115)	2 hours
Engineering Mathematics EE1.....	(113)	2 hours

Alternating Current Circuits and Apparatus EE4....	(114)	3 hours
One Literary Essay		
One Technical Essay		
Summer Vacation Work GE62.....	(95)	_____
	Total	20 hours

Second Term

Electric Railways EE15.....	(117)	3 hours
Electrical Laboratory EE7.....	(115)	2 hours
Electrical Engineering Theory EE18.....	(118)	2 hours
Transmission and Distribution EE14.....	(116)	3 hours
Electrical Apparatus Design EE9.....	(115)	2 hours
Engineering Mathematics EE1.....	(113)	2 hours
Electrical Engineering Practice EE17.....	(117)	2 hours
Alternating Current Circuits and Apparatus EE4....	(114)	4 hours
One Literary Essay		
One Technical Essay		
	Total	20 hours

Third Term

Engineering Law and Procedure GE41.....	(100)	3 hours
Electrical Engineering Theory EE18.....	(118)	2 hours
Transmission Calculations EE14.....	(116)	3 hours
Electrical Apparatus Design EE9.....	(115)	3 hours
Technical Literature EE12.....	(116)	2 hours
Electrical Engineering Practice EE17.....	(117)	2 hours
Thesis EE19.....	(118)	5 hours
	Total	20 hours

Six-Year Course Leading to Degree of B.E. and Ph.B**First Year, B.E.-Ph.B.***First Term*

Fr	Latin.....	ls.....	4 hours
Fr	French or German.....	ls, e.....	3 hours
Fr	Rhetoric.....	ls, e.....	2 hours
Fr	Algebra.....	e.....	4 hours
Fr	Freehand Drawing.....	e.....	3 hours
Fr	Physiology.....	ls, e.....	1 hour
	Lectures		
	Summer Vacation Work		
		Total	17 hours

Second Term

Fr	Latin.....	ls.....	4 hours
Fr	French or German.....	ls, e.....	3 hours
Fr	Rhetoric.....	ls, e.....	2 hours
Fr	Analytic Geometry.....	e.....	4 hours

Fr	Mensuration.....e.....	2 hours
Fr	Physiology.....ls.....	1 hour
Fr	Gymnasium.....ls, e.....	1 hour
	Lectures	

Total 17 hours

Third Term

Fr	Latin.....ls.....	4 hours
Fr	French or German.....ls, e.....	3 hours
Fr	Rhetoric.....ls, e.....	2 hours
Fr	Analytic Geometry.....e.....	2 hours
Fr	Calculus.....e.....	3 hours
Fr	Physiology.....ls, e.....	1 hour
Fr	Surveying.....e.....	2 hours

Total 17 hours

Second Year, B.E.-Ph.B.

First Term

So	Latin.....ls.....	3 hours
Fr	German or French.....ls, e.....	3 hours
So	English and Rhetoric.....ls.....	2 hours
So	Calculus.....e.....	3 hours
So	Surveying.....e.....	2 hours
So	Chemistry.....ls, e.....	3 hours
So	Hygiene.....s, e.....	1 hour
	Summer Vacation Work	

Total 17 hours

Second Term

So	Latin.....ls.....	3 hours
Fr	German or French.....ls, e.....	3 hours
So	English and Rhetoric.....ls.....	3 hours
So	Calculus.....e.....	3 hours
So	Chemistry.....ls, e.....	3 hours
Fr	Mechanical Drawing.....e.....	3 hours

Total 18 hours

Third Term

So	Latin.....ls.....	3 hours
Fr	German or French.....ls, e.....	3 hours
So	English and Rhetoric.....ls.....	3 hours
So	Calculus.....e.....	2 hours
So	Chemistry.....e.....	5 hours
Fr	Trigonometry.....e.....	1 hour

Total 17 hours

Third Year, B.E.-Ph.B. :

First Term

So	German or French.....	ls, e.....	3 hours
So	Physics.....	e.....	3 hours
Jr	English and Rhetoric.....	ls.....	3 hours
Jr	Chemical Laboratory.....	e.....	3 hours
So	English History.....	ls.....	2 hours
So	Mechanics.....	e.....	3 hours
Summer Vacation Work			

Total 17 hours

Second Term

So	German or French.....	ls, e.....	3 hours
So	Physics.....	e.....	4 hours
Jr	English and Rhetoric.....	ls.....	3 hours
So	Descriptive Geometry.....	e.....	3 hours
So	English History.....	ls.....	2 hours
So	Mechanics.....	e.....	2 hours

Total 17 hours

Third Term

So	German or French.....	ls, e.....	3 hours
So	Physics.....	e.....	4 hours
Jr	English and Rhetoric.....	ls.....	3 hours
So	Descriptive Geometry.....	e.....	3 hours
So	French History.....	ls.....	2 hours
So	Mechanics.....	e.....	1 hour
So	Topographical Surveying.....	e.....	3 hours

Total 19 hours

Fourth Year, B.E.-Ph.B.

First Term

Jr	Applied Mechanics.....	e.....	4 hours
Jr	Topographical Surveying.....	e.....	5 hours
Jr	Logic.....	ls.....	3 hours
E Jr	American History.....	ls.....	3 hours
Jr	Biology.....	ls.....	3 hours
Summer Vacation Work			

Total 18 hours

Second Term

Jr	Thermodynamics.....	e.....	2 hours
Jr	Mechanics of Materials and Engineering Laboratory.....	e.....	5 hours
Jr	Psychology.....	ls.....	3 hours
E Jr	American History.....	ls.....	3 hours
Jr	Biology.....	ls.....	3 hours

Jr	Natural Perspective.....e.....	1 hour
So	Electrical Laboratory.....e.....	1 hour
		Total 18 hours

Third Term

Jr	Stresses.....e.....	4 hours
Jr	Hydraulics.....e.....	3 hours
Jr	Ethics.....ls.....	3 hours
E Jr	American History.....ls.....	3 hours
Jr	Biology.....ls.....	3 hours
So	Electrical Laboratory.....e.....	1 hour
		Total 17 hours

Fifth Year, B.E.-Ph.B., Option A*First Term*

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	3 hours
Sr	Economics.....ls, e.....	3 hours
Sr	Stresses.....e.....	4 hours
Sr	Motors and Motive Power.....e.....	2 hours
Sr	Rhetoric.....ls.....	1 hour
E Jr	General Geology.....ls.....	3 hours
Summer Vacation Work		

 Total 19 hours
Second Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	3 hours
Sr	Sociology.....ls.....	3 hours
Jr	Kinematics and Machine Drawing.....e.....	3 hours
Sr	Motors and Motive Power.....e.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Electrical Machinery.....e.....	3 hours

 Total 19 hours
Third Term

E Sr	European History.....ls.....	3 hours
E Sr	International Law.....ls.....	3 hours
Sr	Sociology.....ls.....	3 hours
Jr	Route Surveying.....e.....	3 hours
Jr	Spherical Trigonometry and Astronomy.....e.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Stereotomy.....e.....	2 hours

 Total 18 hours

Fifth Year, B.E.-Ph.B., Option B

First Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	2 hours
Sr	Economics.....ls, e.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Elements of Law.....e.....	1 hour
Sr	Stresses.....e.....	4 hours
Sr	Economic Geology.....e.....	2 hours
Sr	Motors and Motive Power.....e.....	2 hours
	Summer Vacation Work	

Total 18 hours

Second Term

E Sr	European History.....ls.....	3 hours
E Sr	Comparative Politics.....ls.....	2 hours
Sr	Economics.....ls.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Elements of Law.....e.....	2 hours
Jr	Electrical Machinery.....e.....	3 hours
Sr	Motors and Motive Power.....e.....	3 hours

Total 17 hours

Third Term

E Sr	European History.....ls.....	3 hours
E Sr	International Law.....ls.....	2 hours
Sr	Economics.....ls.....	3 hours
Sr	Rhetoric.....ls.....	1 hour
Jr	Law of Property and Contracts .e.....	3 hours
Jr	Route Surveying.....e.....	3 hours
Jr	Stereotomy.....e.....	3 hours

Total 17 hours

Sixth Year, B.E.-Ph.B., Option A

First Term

Sr	Railroad and Trolley Construc- tion and Economy.....e.....	6 hours
Sr	Principles of Aesthetic Design.....	3 hours
Jr	Elements of Law.....e.....	1 hour
Sr	Economic Geology.....e.....	2 hours
Jr	Highways and Pavements.....e.....	3 hours

Total 15 hours

Second Term

Sr	Engineering Design.....e.....	4 hours
Sr	Water Supply.....e.....	2 hours
Sr	Building Construction.....e.....	2 hours

Jr	Elements of Law.....e.....	2 hours
Sr	Least Squares.....e.....	3 hours
Sr	Bacteriology.....	3 hours

Total 16 hours

Third Term

Sr	Outlines of Architecture.....e.....	2 hours
Sr	Engineering Design.....e.....	4 hours
Sr	Water Supply and Sewerage...e.....	5 hours
Jr	Law of Property and Contracts.e.....	3 hours
Sr	Geodesy and Field Astronomy..e.....	3 hours

Thesis

Total 17 hours

Sixth Year, B.E.-Ph.B., Option B

First Term

Sr	Railroad and Trolley Construc- tion and Economy.....e.....	6 hours
Sr	Principles of Law of Corpora- tions.....e.....	3 hours
Sr	Principles of Aesthetic Design.....	3 hours
Jr	Highways and Pavements.....e.....	3 hours

Total 15 hours

Second Term

Sr	Engineering Design.....e.....	4 hours
	Engineering Projects.....	4 hours
Sr	Principles of Finance and Financial Operations.....e.....	2 hours
Sr	Building Construction.....e.....	2 hours
Sr	Bacteriology.....	3 hours

Total 15 hours

Third Term

Sr	Outlines of Architecture.....e.....	2 hours
Sr	Engineering Design.....e.....	4 hours
Sr	Water Supply and Sewerage...e.....	5 hours
Sr	Principles of Accounting.....e.....	3 hours
Sr	Principles of Administration...e.....	3 hours

Thesis

Total 17 hours

ATTENDANCE AND STANDING

Registration. Every student must report at the registrar's office at the beginning of each term and register college or local residence.

Any change of residence during the term must be reported at once at the treasurer's office.

Changes of Course. Students are not permitted to pass from one course to another, or to take any studies out of their regular order, without the specific authorization of the faculty.

Chapel. Morning worship is held in the chapel every college day and attendance is required of all students.

Reports. A daily record of scholarship and of attendance at class and chapel is kept and a report is sent at the close of each term, or more frequently, to the student's parent or guardian.

Standing. There are four grades of scholarship:—from 9 to 10 inclusive, first grade; from 8 to 8.9, second grade; from 7 to 7.9, third grade; from 6 to 6.9, fourth grade. A student who receives a mark of 4 to 5.9 is reported as conditioned; below 4, as having failed. In the mathematical studies of the engineering course the sustaining mark is 7, and any mark below 5 indicates failure.

A student who is reported as having failed in any subject must take that subject again in class; or he may be required, at the option of the department concerned, to make up the subject under an approved tutor, in such manner as the department may designate, and to pass an examination in it at the second conditions examination after the imposition of the mark of failure.

Those receiving the highest marks for the whole course are entitled to appointment as commencement orators, five places being assigned to students in the academic courses and five to students in the engineering courses.

Absences in General. Absences are entered, in every course, against a student from the beginning of a term until he reports his return to the registrar.

Absences are recorded as of two kinds:—excused and unexcused. Excuses are given only by the committee on absences, which meets every Monday afternoon from two to five o'clock.

Class-room Absences. Attendance at all exercises is required and it is expected that no student will be absent except in case of unavoidable necessity.

Applications for excuses must be made to the committee on absences the first Monday following the date of absence.

No excuse remits any work of the term. The work lost by reason of excused absence must be made up in a manner satisfactory to the head of the department concerned, unless the nature of the work renders this impossible, in which case the student's grade will suffer.

After a number of unexcused absences equal to three weeks of recitations in any subject, the student is not allowed to continue his work in that subject, but must take it with the succeeding class.

Chapel Absences. Twelve absences without excuse are allowed each term. All absences after the first twelve lower the standing at the rate of one unit for every two absences.

No absences are excused except for protracted illness or for reasons in every way exceptional.

Applications for excuse from chapel for a term must be made within the first two weeks of that term.

In the determination of a student's general standing, marks for chapel attendance are counted as the equivalent of a one hour per week recitation. They affect the granting of scholarships and the selection of honor men.

Conditions. Students who may be admitted with entrance conditions must remove them not later than the March examinations. Those who fail to meet this requirement are classed as irregular students. Those who fail to remove all entrance conditions before the beginning of the next college year will not be admitted to any of the work of that year. No student who has any conditions unsatisfied at the close of the conditions examinations in September at the opening of the college year, is permitted to continue with his class without the express authorization of the faculty.

Conditions not removed at the next conditions examination held after their imposition must be made up in class at the first

opportunity, and this work takes precedence of the regular work in case of conflict in the schedule. No senior who has failed to make up all his back work by the end of the second term of senior year can be recommended for a degree, except by special vote of the faculty.

Examinations for the removal of conditions occur on the Saturday next preceding the opening of the fall term, and on the first Friday and Saturday in December, March and May, as indicated in the college calendar. Registration for these examinations closes at 12 M. on the Saturday next preceding the date set for each. A fee for each examination to be taken must be paid at the time of registration, at the college office.

Students who have been excused by the dean, in writing, from any term examination are reported "Not examined" and may be examined later, at a time to be approved by the instructor, but such examination cannot be postponed beyond the first conditions examinations after such report. A failure to pass is regarded as a condition and must be made up at the next following conditions examination.

Unless excused in writing by the dean, students absent from term examinations are reported as "Not sustained," or "Failed."

Any student permitted by the faculty to anticipate or defer a term examination is required to pay a fee for each special examination made necessary.

A failure to report at any appointed examination is regarded as a trial, unless previously excused.

Irregular Students. Students who are seriously deficient in standing may be dropped to a lower class, or if the deficiency is such as to leave a prospect of regaining class standing, may be rated as irregular students. Irregular students have no class relation or class privilege; they are debarred from competition for prizes and from the attainment of special honors.

The evidence that a student's continuance in college is resulting in no advantage to himself, or in harm to others, will occasion his separation from the institution.

EXPENSES

Registration fee	\$5.00
Tuition, A. B., Ph. B. and B. S. courses, per term.....	30.00
Tuition, engineering courses, per term.....	50.00
Graduate courses in engineering, per term.....	50.00
Room rent in dormitories, per term.....\$20 to	25.00
Incidental fee, for maintenance of grounds and public rooms, use of library, gymnasium, etc., per term.....	8.00
Graduation fee, including diploma.....	15.00
Chemical laboratory fees:	
Courses 1 and 1a, per term.....	8.00
Courses 2, 2a, 3, 4 and 5, per term.....	15.00
Course 6, per term.....	20.00
Electrical laboratory fees:	
Junior year, per term.....	7.00
Senior year, per term.....	10.00
Biological laboratory fees:	
Courses 1 and 5, per term.....	2.00
Course 4, per term.....	6.00
Physics laboratory fees:	
Course 1a, per term.....	4.00
Course 2, per term.....	5.00
Conditions examination fee	2.00
Fee for certificate of work done.....	2.00
Fee for certificate of graduation.....	1.00
Master's degree, registration and diploma.....	20.00

The tuition fees named will be in force for classes entering in and after 1911. For classes which entered before that year the rates of \$25 and \$40 will be continued. In the course leading to the degree of Doctor of Philosophy the maximum payment will be \$300 if the degree be earned in five years from the time of registration.

Students who take their senior year's work at the Albany Medical College as provided on page 3, are charged \$125 for the year's tuition, \$50 to be paid to the treasurer of Union College and \$75 to the treasurer of the Albany Medical College.

Tuition and other fees are due on the first day of each term.

Students must conform to the rules of the treasurer's office regarding registration at the opening of each term, and will not be admitted to any classes or laboratories until the required fees are paid.

No deductions are made because of absence from college.

No part of a term bill will be refunded for any cause.

Damage done by students to college property will be charged to their account.

No degree, certificate or dismissal will be given to any student until his bills are paid.

Board can be procured for \$3.50 to \$5 a week.

It is the custom of the student body to levy an annual campus tax of sixteen dollars, six dollars of which is payable at the beginning of the fall term, five dollars at the beginning of the winter term, and five dollars at the beginning of the spring term. This money is used for the support of the different branches of athletics and of the musical association.

College Rooms

The college has two steam-heated dormitories, accommodating one hundred students. Most of the rooms are arranged in suites of two, and are all unfurnished; they are rented at prices varying from \$60.00 to \$75.00 per year for each student occupying a room. Students about to enter college who wish rooms in the dormitories should make early application to the assistant treasurer for a list of rooms giving location and price. No room is secured until a lease is signed and filed in the college office; a student must occupy the room for which he signs, as transfers are not allowed. The rooms are cared for by competent persons, employed and paid by the college; each occupant of a college room will be held responsible for any damage done to the room. At the end of the college year students giving up their rooms for any reason whatsoever must remove all furniture and property from their rooms not later than the Saturday following commencement day, as after this time the dormitories will be closed until the Saturday before the first registration day of the fall term. The dormitories will also be closed during the Christmas recess.

Students leaving property in their rooms during the vacations do so at their own risk.

The Union College Christian Association offers its services to students who find it necessary to secure rooms in the city. The association inquires into the character of all places offered as lodgings for students, and, shortly before the beginning of the college year, provides a list of approved places.

Employment Bureau

The Christian Association acts as a bureau with the object of giving assistance to students who desire employment for the purpose of meeting the expenses of a college education. It has been found that many opportunities for work exist in Schenectady by which students may earn from \$2 to \$4 per week, during term-time, without seriously interfering with their college studies. A considerable number of students meet the expense of board by acting as waiters in the various restaurants and boarding houses in the city. Others find employment as clerks in stores on Friday evenings and Saturdays; others in caring for furnaces and in other work about private residences. Applications for the assistance of the bureau may be addressed to the secretary of the faculty.

SCHOLARSHIPS

Funds given especially for this purpose enable the college to offer aid to a number of students each year, as follows:

General Scholarships

Available for students in the A. B., Ph. B. and B. S. courses.

Scholarships covering a part or the whole of the tuition charges are granted to students upon the following conditions:

1. The declaration of a purpose to remain in Union College until graduation.
2. An acknowledgment that the aid received is regarded as a debt of honor, to be paid as soon as possible after leaving college.
3. The presentation of satisfactory evidence of financial need.

Scholarship aid will be withdrawn temporarily upon the failure of the student to be sustained in any subject, or upon his failure to maintain an average grade of eighty per cent. in the studies of any term, and after it has been withdrawn for three successive terms it will not be renewed.

Any serious breach of college discipline, evidence of moral delinquency, or repeated unnecessary expenditures will also result in the withdrawal of scholarship aid.

Credentials necessary for admission to another college will not be given to any scholarship student until he has repaid to the college treasury the full amount of scholarship aid received.

Application blanks will be provided by the secretary upon request.

John David Wolfe Memorial Scholarships

The income of a fund of fifty thousand dollars established by the generosity of Miss Catharine Lorillard Wolfe is designed to aid students from the southern states.

These scholarships are available for students in all courses and are governed by the conditions named above.

Application blanks will be provided by the secretary upon request.

Levi Parsons Scholarships

A generous benefaction by the late Hon. Levi Parsons, of Gloversville, N. Y., maintains several scholarships in each class, yielding at least one hundred and fifty dollars a year each.

All scholarships begin at the rate of one hundred and fifty dollars a year. After the first term the value of the scholarship depends upon the standing of the student.

Scholarships of \$300 a year are granted to students who have had, in the preceding term, an average grade of 90 per cent. or more.

Scholarships of \$200 a year are granted to students who have had, in the preceding term, an average grade of 85 per cent. or more.

Scholarships of \$150 a year are continued to students who have had, in the preceding term, an average grade of 80 per cent. or more.

Among applicants, preference is given:

First, to blood relatives of the founder, bearing his name and living in the county of Fulton, Montgomery or Hamilton, in the State of New York, and especially to those bearing his name and living in Gloversville or Johnstown, Fulton county.

Second, to applicants living in the following places, according to the following order:

1. The city of Gloversville, Fulton county.
2. The city of Johnstown.
3. The township of Johnstown.
4. The county of Fulton.
5. The adjoining counties of Montgomery and Hamilton.
6. The blood relatives living in any other part of the United States.

Nomination to scholarships is made by the board of directors of the Gloversville Free Library; and the nominees must satisfy the college requirements for admission. Applications are received by the directors of the Gloversville Free Library, Gloversville.

The continuance of these scholarships is subject to the rules stated on page 145, concerning the withdrawal of the general scholarships of the college.

Thomas Armstrong Scholarships

The late Thomas Armstrong, of Plattsburg, N. Y., provided for the grant of scholarships to residents of Clinton county, sons of practical farmers.

Nominations to these scholarships are made by the board of supervisors of Clinton county, and the yearly value of each scholarship is not to exceed two hundred dollars.

R. C. Alexander Prize Scholarship

The sum of four thousand dollars has been given in memory of the late Robert Carter Alexander, of the class of 1880, and a life trustee of the College, to be devoted to the establishment of a scholarship for the encouragement of classical studies.

The income of this fund, amounting to two hundred dollars per year, is awarded as a prize scholarship, upon the following conditions:

1. Candidates must be students in the classical course, and of approved moral character.
2. They must be free from conditions and must have obtained an average of at least eighty per cent. in the studies of the first two terms of the freshman year.
3. They must pass successfully a special examination at the close of the freshman year in each of the following subjects: Latin, Greek, mathematics, English composition, and either French or German. These examinations will be based upon the work of the freshman year.
4. The award will be made to the candidate obtaining the highest general average in these examinations and in all the previous work of the college course.*
5. The prize scholarship will be forfeited upon evidence of moral delinquency, or upon failure to maintain an average grade of ninety per cent. in the work of any subsequent term. The scholarship, once lost, cannot be regained, but will be awarded, upon the above conditions, to a student in the next entering class.
6. All questions pertaining to the administration of this

*This scholarship is now held by Donald A. Coulter, of the class of 1915.

scholarship will be determined by a committee composed of the president of the college, the chairman of the scholarship committee of the faculty, and a member of the board of trustees.

Horace B. Silliman Scholarship

Three scholarships were founded by the late Horace B. Silliman, of the class of 1846, giving to each recipient the income from two thousand dollars (\$2,000) annually.

These scholarships are awarded to active members of the college Young Men's Christian Association by a committee composed of the president, the dean, and the president of the Young Men's Christian Association, under such rules and conditions as may be determined by such committee, preference being given to students in the classical course.

The award is made to one student annually at the close of the freshman year.

Daniel F. Pullman Scholarship

The late Daniel F. Pullman, of Knox, Albany county, New York, provided in his will for the establishment of a scholarship of the value of \$120 a year, to be given to a student in the classical course.

The award is made by the faculty, and in accordance with the terms of the will preference is given to members of the Methodist Episcopal Church.

Class of 1895 Scholarship

A fund has been given by the class of 1895 which provides for the grant of a scholarship of a yearly value not to exceed one hundred dollars.

The award is made by the faculty and, in accordance with the wish of the donors, preference will be given to descendants of members of the class.

Application for appointment to this scholarship must be made annually before September 1.

The conditions with respect to college standing governing the award of the general scholarships of the college apply to this scholarship also.

Daniel Vedder Scholarship

By the will of the late Daniel Vedder, of Schenectady, a scholarship has been established, of the annual value of two hundred dollars.

The scholarship is awarded by the faculty, and is given to a student who is preparing to enter the Christian ministry.

The holder must maintain an average standing of ninety per cent., and must pledge himself to abstain from the use of intoxicating liquors and tobacco.

If none of the candidates meets in every respect the conditions stated in the will of the donor, the scholarship will be awarded in such a way as to carry out as fully as possible the wishes of the founder.

The award is made at the end of the freshman year.

Law School Scholarships

Applicants for these scholarships, described below, must register at the college office by May 1st of senior year.

John K. Porter Memorial Scholarship

A fund given by Mrs. John K. Porter, in memory of her husband, is designed to assist students who, after graduating from college, pursue the study of law. The fund provides, at present, for three scholarships of ninety dollars each. The awards are made at commencement to seniors chosen by the faculty.

Gilbert M. Speir Memorial Scholarship

A fund given by Mrs. John K. Porter, in memory of her father, the late Judge Gilbert M. Speir, provides another scholarship for students of law who go from Union College to the Albany Law School, another department of Union University.

The sum of ninety dollars will be awarded at commencement to the senior chosen by the faculty, the choice being made on the basis of excellence in historical studies.

PRIZES

The following prizes are awarded from funds given especially for this purpose:

Blatchford Oratorical Medals

The Hon. Richard M. Blatchford, LL. D., of New York city, founded oratorical prizes, consisting of two gold medals of the value of the interest on \$1,000, which are given to the two members of the graduating class who deliver at commencement the best orations, "regard being had alike to their elevated and classical character and to their graceful and effective delivery." These medals are awarded by a committee appointed by the trustees, and are presented at the close of the exercises.

Warner Prize

The Hon. Horatio G. Warner, LL. D., of Rochester, N. Y., founded an annual prize to be presented at commencement to the "graduate of Union College, classical or Latin-scientific course who shall reach the highest standing in the performance of collegiate duties, and also sustain the best character for moral rectitude and deportment, without regard to religious practice or profession." The prize is a silver cup and is awarded by the faculty.

Ingham Prize

The Hon. Albert C. Ingham, LL. D., of Meridian, N. Y., founded an annual prize of the interest of \$1,000 (in the form of plate, or medal, or money, or both medal and money, as preferred), to be awarded at commencement to that senior connected with the college for not less than two years who shall offer the best essay on one of two assigned subjects in English literature or history.

The essay must be typewritten, and must contain not less than 4,000 nor more than 4,500 words. Its signature (fictitious) and the writer's real name must be enclosed in a sealed envelope; the signature and the name of the prize being given on the outside. The essay, with the note, must be presented by noon on the fifteenth day of May.

Allen Essay Prizes

The Hon. William F. Allen, LL. D., of Oswego, N. Y., established a fund of \$1,000, the interest of which is devoted to prizes for the best three essays on any subject, submitted by members of the senior class.

The essay must be typewritten, and must contain not less than 2,500 nor more than 3,000 words, and must be signed and presented (with note, as in the case of the Ingham essay) by noon on May 15th. The prizes are awarded at commencement.

Oratorical Prizes

Prizes are presented at commencement to the two juniors and the two sophomores who deliver the orations best in composition and delivery on the occasion of prize speaking in commencement week. Four juniors and four sophomores are selected for this competition by a committee of the faculty on the fifteenth of April. Candidates must be in full standing on appearance before the committee.

Allison-Foote Prizes

Mr. George F. Allison, of New York city, and the late Wallace T. Foote, of Port Henry, N. Y., founded a prize for the encouragement of debate in the literary societies. The prize consists of \$100 in cash, and is awarded as the result of a public competition between representatives of the Adelpic and Philomathean Literary Societies. Fifty dollars is awarded to the society presenting the strongest argument. The remaining \$50 is awarded to the debater who makes the best single speech, regardless of his society relations. Contestants must have engaged in at least ten debates in their respective societies during the college year immediately preceding. All further details are left to the determination of a committee, consisting of the president, the dean of the college, and the professor of Rhetoric.

Daggett Prize

In 1899 Miss E. Josephine Daggett bequeathed to Union College the sum of \$1,000, the interest of which is devoted to a prize

for conduct and character, without respect to scholarship, to be given at Commencement to a senior who shall have passed through a full course of four years at the college.

Pullman Prizes

Mr. Daniel F. Pullman, of Knox, Albany County, New York, bequeathed to Union college the sum of \$2,000 to found two annual prizes.

The Pullman Classical Prize of \$40 is given to that member of the graduating class who, in an attendance of three years, has attained the highest standing in scholarship in the classical course.

The Pullman Engineering Prize of \$40 is given to that member of the graduating class who has taken the full course in the engineering department and has attained the highest standing in that course.

In awarding both prizes, preference is given to members of the Methodist Episcopal Church.

Henry George Essay Prizes

Mr. H. L. Baggerly, of the class of 1894, has founded two prizes to be offered annually for the best essays on the economic theory of the single tax, as presented in Henry George's *Progress and Poverty*. The prizes are of \$60 and \$40, and are open to competition by members of the senior and junior classes.

The award is made by a committee of the faculty.

Bailey Prize

A silver cup, of the value of \$50, has been offered by Dr. Frank Bailey, to be awarded annually to that member of the senior class who has rendered the greatest service to the college in any field. In awarding this prize, consideration will be given to any effort resulting in conspicuous improvement in the conduct of athletic sports or in the character of undergraduate publications; in the increase of college enthusiasm or the elevation of the tone of college life; in the advancement of the interests of the college among preparatory schools or in the community

as a whole; or in any addition to those things which bring honor to the name of Union.

Van Orden Prize

Mr. W. T. Van Orden, of the class of 1839, has founded an annual prize of the interest on \$1,000, to be awarded to a member of the freshman class for excellence in the work of the English department and the writing of the best essay.

The Goodrich-Duane Prizes

Two prizes, of \$30 and \$20, are awarded to the best speakers in an extemporaneous debate held in commencement week in each year. A general topic is previously announced, and the particular subject of debate is given on the evening of the contest. The competition is open to students of all classes.

The first prize is given by Mr. James A. Goodrich, of the class of 1879, and the second prize by Dr. Alexander Duane, of the class of 1878.

DEGREES AND HONORS

The candidate for a degree must have paid all dues to the college treasurer, and returned all books borrowed from the college library; he must also attend the conferring of degrees, or be expressly excused therefrom. The candidate for a bachelor's degree must have entered college not later than the beginning of the first senior term.

Degrees for Resident Study

The degrees of the college are conferred by authority of the board of trustees upon candidates who have successfully completed courses of resident study, as follows:

The Bachelor's Degree

The degree of Bachelor of Arts will be conferred upon candidates who have successfully completed Course 1, page 28; the degree of Bachelor of Philosophy, upon those who have successfully completed Course 2, page 28; the degree of Bachelor of Science, upon those who have successfully completed Course 3, page 28; the degree of Bachelor of Engineering, upon those who have successfully completed Course 4, first, third and fourth division, pages 28-29; the degrees of Bachelor of Engineering and Bachelor of Philosophy, upon those who have successfully completed Course 4, second division, page 29.

The Master's Degree

The degree of Master of Civil Engineering will be conferred upon candidates who have successfully completed Course 5, first division, page 29; the degree of Master of Electrical Engineering upon those who have successfully completed Course 5, second division, page 29.

The Doctor's Degree

The degree of Doctor of Philosophy will be conferred upon students of electrical science who fulfill the requirements stated on page 124.

Degrees for Non-Resident Study

The degree of Master of Arts or of Master of Science will be given to graduates of Union College who have been registered

as candidates for the degree not less than two years, have completed definite courses of advanced study in two departments, and have submitted a satisfactory thesis and passed satisfactory examinations. The total amount of work done is intended to be the equivalent of one year of resident study.

A year of resident study in any non-professional graduate school, approved at the time of registration by the two departments concerned, will be accepted instead of the two years' study above mentioned on fulfillment of the same conditions regarding thesis and examinations.

Each candidate for this degree must register with the dean of the college his name, address, and the two departments chosen, not later than the fifteenth of October of the year for which he desires registration.

The thesis must be presented to the dean by May first for submission to the faculty in time to provide for all necessary examinations before commencement.

A fee of \$20 is charged, which covers examinations and diploma; of this amount \$10 is payable at the time of registration and \$10 at the time of the final examinations.

Honors

All commencement prizes are limited to A. B., Ph. B. or B. S. students who have entered at or before the beginning of the senior year, and who are in full standing at the close of the second term; and to engineering students entered likewise and in full standing at the close of the second term, in both the engineering course and the English department of the B. S. or Ph. B. course.

Commencement Appointments

These honors are assigned to ten seniors, five from the academic courses and five from the engineering courses, on the basis of scholarship, as stated under Standing, page 139. Provisional appointments are made at the close of the second term senior, and become final if those who receive them retain the same relative rank to the end of their course. Under present regulations, no other persons can become competitors for the Blatchford Oratorical Medals.

Seniors not in full standing at the close of the second term are ineligible to a Commencement appointment.

Students who receive Commencement appointments as the result of the third term's work are excused from speaking unless the faculty direct otherwise.

The Valedictory

This honor is awarded to the senior of highest standing among the ten receiving Commencement appointments.

Special Honors

Special honors are also given at graduation under the following conditions: Any department may offer a course, approved by the Education Committee, leading to Special Honors. The head of a department may direct the choice of electives in other departments, for honor students, to the number of six hours in each year. The time of registration for honors will be determined separately for each department. The candidate for special honors must have attained in all the studies of the department in which he tries for honors a rank of not less than ninety per cent. of the maximum. The evidence that he has successfully completed the extra course prescribed for him must be submitted not later than June 1st of the senior year to the faculty, who shall decide in each case whether the work done is worthy of an honor. The honors attained are stated in the diploma, and the names of the students who take honors are printed on the Commencement programme.

Phi Beta Kappa Society

At the end of the third term of the senior year, one-third of the members of the graduating class in the classical course, candidates for the degree of Bachelor of Arts, may be elected to membership in the Phi Beta Kappa Society. The election is based upon scholarship and character and is given, as a rule, to the men who stand highest in scholarship in their class.

The Alpha of New York chapter was established in 1817; and ever since that time election to the society has been one of the highest distinctions to be gained by scholarship.

Sigma Xi

Election to the honorary scientific society of Sigma Xi, is one of the honors open to seniors of marked ability in the scientific and engineering departments. Membership is confined to the faculty, senior candidates for graduation, and alumni. The election occurs during the latter part of the senior year and selections are made on the basis of high general scientific or engineering ability and particularly as a mark of promise of ability in research and independent work.

The society was founded at Cornell University in 1886 and has chapters at more than twenty of the leading colleges and universities of the country. The Union chapter was established in 1887, since which time about one hundred members have been elected by this chapter.

DEGREES CONFERRED
AT THE
ONE HUNDRED AND SIXTEENTH ANNUAL
COMMENCEMENT

JUNE 12, 1912

Honorary

LL. D.

William Milligan Sloane.....New York City
 John Van Rensselaer Hoff.....New York City

Litt. D.

Cornelius Edward Franklin.....New York City

L. H. D.

William Jay Kline.....Amsterdam

D. D.

George Harkness Wichita, Kansas
 Irving Peake Johnson.....Minneapolis, Minn.
 Francis Vischer Van Vranken.....Leeds

A. M.

Theodore James Bradley.....Albany

In Course

A. M.

Willis T. Hanson, Jr.....Schenectady
 Samuel B. Howe.....Plainfield, N. J.

Ph. B.

Harold Arthur Gordon.....Schenectady
 (as of the class of 1911)

B. S.

Daniel Tobias Read.....Monk's Corners, S. C.
 (as of the class of 1909)

B. E.

Seward Daniel Hendricks.....	Sodus
(as of the class of 1910)	
Laurence William Bentley.....	Binghamton
(as of the class of 1911)	
Arthur Doran Brown.....	Schenectady
(as of the class of 1911)	

Class of 1912**A. B.**

James Alexander Barkley.....	Lake George
Blaine Raymond Butler.....	Johnstown
Edward Francis Hennelly.....	Johnstown
Robert Morris Palmer.....	Gloversville
Robert Porter Patterson.....	Glens Falls
James Henry Potter.....	Amsterdam
Henry Austin Schermerhorn.....	Schenectady
Raymond Dalton Shepard.....	Hudson
Kenneth Eastwood Walser.....	Cohoes
Chauncey Holmes Winters.....	Richmondville

Ph. B.

Allan Bernard Mann.....	Schenectady
Arthur Daniel Mann.....	Schenectady
Ralph Louis Streever.....	Schenectady

B. S.

William Wallis Coykendall.....	Elmira
Thomas Stanly A. Fairbairn.....	Buffalo
Charles Louis Hequembourg.....	West Albany
Floyd Clinton Kelley.....	Walton
Myron Edward Krueger.....	Schenectady
Alexander H. Leamon.....	Schenectady
Edward Lawrence Mack.....	Vergennes, Vt.
Wallace Harmon Macmillan.....	Schenectady
Robert Paunee Marsh.....	Binghamton
Edward Leo McDermott.....	Schenectady
Fred Francis McGauley.....	Schenectady

John Mortimer Minuse.....	Port Chester
Milton John Neubauer.....	Schenectady
Roy Webber Peters.....	Schenectady
James Edwin Riley, Jr.....	Elmira
Henry Roseboom Sawyer.....	Cherry Valley
Edgar John Simmons.....	Glens Falls
Daniel Glen Smith.....	Schenectady

B. E.

Garfield Van R. Arthur.....	Keeseville
William Maser Beck.....	Kenmore
Leon LeRoy Biche.....	Black River
Ralph de Pomerait Clarke.....	Schenectady
Howard Elisha Cook.....	Franklin
Harry Francis Coward.....	Buffalo
Robert E. Dennis.....	Kalamazoo
Earl Devendorf.....	Schenectady
Walter Stratton Easterly.....	Gloversville
Paul Fasoli	Glens Falls
James Harry Griffin.....	Fort Edward
William A. Hardenbergh.....	White Sulphur Spa.
Walter Sinn Hoyt.....	Monterey, Mass.
Montgomery Ker.....	Jersey City
Robert Henry Lowrie.....	DeLand, Fla.
Walter John Mann.....	New York City
Harold Wheeler Morss.....	Albany
Alden Jesse Palmer.....	South Bethlehem
David Baker Peckham.....	Bainbridge
William Allen Rice.....	Parksville
Alexander H. Robertson, Jr.....	Brooklyn
Edgar Newton Scott.....	Schenectady
Frank Cady Sellnow.....	Albany
Joseph Bernard Shaw.....	Auburn
Fred Arthur Slade.....	Buffalo
Tulloch McCosh Townsend.....	Phelps
Martin Emanuel Untermeyer.....	New York City
Jacob Henry Van Aernam.....	Altamont
Bayard Boyd Webb.....	Fulton

AWARDS 1912

Valedictory

Chauncey H. Winters.....Richmondville

Commencement Orations

Edward F. Hennelly.....Johnstown
 Robert P. Patterson.....Glens Falls
 James H. Potter.....Amsterdam
 Kenneth E. Walser.....Cohoes
 Chauncey H. Winters.....Richmondville

Engineering Theses

Walter Stratton Easterly.....Gloversville
 Leon L. Biche.....Black River
 Ralph de Pomerait Clarke.....Schenectady
 Harry F. Coward.....Buffalo
 Robert E. Dennis.....Kalamazoo, Mich.

Special Honors

In English.....Morris Palmer, Gloversville
 In French.....Kenneth E. Walser, Cohoes
 Chauncey H. Winters, Richmondville
 In History and Govern-
 ment Allen B. Mann, Schenectady
 Robert P. Patterson, Glens Falls
 In Latin.....Chauncey H. Winters, Richmondville
 Robert P. Patterson, Glens Falls
 In Mathematics.....Chauncey H. Winters, Richmondville
 In Philosophy.....James A. Barkley, Lake George
 Allen B. Mann, Schenectady
 Arthur D. Mann, Schenectady
 John M. Minuse, Port Chester
 James H. Potter, Amsterdam
 Kenneth E. Walser, Cohoes

Warner Prize

Chauncey H. Winters

Ingham Prize

Allen B. Mann

Allen Prizes

1st. James H. Potter

2nd. Ralph de P. Clarke

3rd. Kenneth E. Walser

Goodrich-Duane Prizes

Theodore W. Hanigan

Roy W. Peters

Prizes for Oratory**Juniors**

Don K. Hutchens

Robert F. LaBarron

Sophomores

Arthur Loeb

Morgan L. Williams

Allison-Foote Prizes

Won by the Philomathean Society
and

James H. Potter

Blatchford Oratorical Medals

1st. Kenneth E. Walser

2nd. James H. Potter

Daggett Prize

James H. Potter

Pullman Prizes

Chauncey H. Winters

Robert E. Dennis

Baggerly Prizes

Robert P. Patterson

Kenneth E. Walser

Alexander Prize Scholarship

Donald A. Coulter

John K. Porter Memorial Scholarships

Robert P. Patterson

Arthur D. Mann

Roy W. Peters

Gilbert M. Speir Scholarship

Arthur B. Mann

Horace B. Silliman Scholarship

Raymond S. Blodgett

Daniel Vedder Scholarship

Austin G. Martin

Phi Beta Kappa

Edward Francis Hennelly

Robert Porter Patterson

James Henry Potter

Kenneth Eastwood Walser

Chauncey Holmes Winters

Sigma Xi

Leon LeRoy Biche

Robert Earle Dennis

Walter Stratton Easterly

James Harry Griffin

Floyd Clinton Kelley

Robert Paunee Marsh

Edgar Newton Scott

Chauncey Holmes Winters

ALBANY MEDICAL COLLEGE

The Medical College building, situated on Eagle street, Albany, is well appointed in its lecture rooms, laboratories, dissecting room and museums. The laboratories in chemistry and physiological chemistry are fitted with every requisite for the use of the classes and the illustration of the lectures, while the Bender Hygienic Laboratory furnishes unexcelled facilities for instruction in histology, pathology, bacteriology, experimental physiology, pharmacology and clinical microscopy.

The location of the college is such as to afford superior advantages to the student. The hospitals and dispensaries furnish an abundant supply of material for the illustration of clinical medicine and surgery, while the museums are especially rich in anatomical and pathological preparations.

The course of instruction is graded and extends over four years. The curriculum embraces lectures by professors and lecturers; recitations conducted mainly by instructors, and practical demonstrations, clinical teaching and laboratory work, in which the professors in the different departments are assisted by clinical assistants and demonstrators.

The Albany Hospital, St. Peter's Hospital, Child's Hospital, St. Margaret's House, Albany's Hospital for Incurables, County Hospital, South End Dispensary, Albany Orphan Asylum and dispensaries connected with each are, by the regulation of their governing boards, made available for clinical purposes to the students, and appointments to positions on the house staffs of the Albany Hospital, and other hospitals in Albany and neighboring places, are annually made and are competed for by the members of the graduating class.

TRUSTEES

President

SIMON W. ROSENDALE

Vice-President

ALDEN CHESTER

Treasurer

ROBERT OLCOTT

Secretary

CHARLES F. VAN BENTHUYSEN

CLARENCE RATHBONE	WALTER L. PALMER
OSGOOD H. SHEPARD	CHARLES GIBSON
AMASA J. PARKER	LUTHER H. TUCKER
J. TOWNSEND LANSING	EDWARD J. HUSSEY
JESSE W. POTTS	ROBERT C. PRUYN
EDWARD A. DURANT	JAMES B. McEWAN
CLIFFORD D. GREGORY	JOHN M. BIGELOW
EDWARD BOWDITCH	CHARLES A. RICHMOND
FREDERICK TOWNSEND	EDMUND N. HUYCK
GEORGE C. VAN TUYL, JR.	

RECORDER OF ALBANY	} <i>Ex-Officio</i>
MAYOR OF ALBANY	

Catalogues are sent with care, and graduates of the college changing their post-office address, or not receiving them, will please notify

WILLIS G. TUCKER, M. D., *Registrar*

ALBANY MEDICAL COLLEGE

Albany, New York

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor of the University

JOHN MILTON BIGELOW, M. D., PH. D.
Emeritus Professor of Materia Medica, Therapeutics and
Diseases of the Throat and Nose

*WILLIAM HAILES, M. D.
Emeritus Anthony Professor of Pathological Anatomy, His-
tology and Fractures and Dislocations

ALBERT VANDER VEER, M. D., PH. D., LL. D.
Professor of Surgery

SAMUEL BALDWIN WARD, M. D., PH. D.
Dean
Professor of Theory and Practice of Medicine

JAMES PETER BOYD, M. D.
Professor of Obstetrics and Diseases of Children

WILLIS GAYLORD TUCKER, M. D., PH. D.
Registrar
Professor of Chemistry and Toxicology

CYRUS STRONG MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC COLTON CURTIS, M. D.
Professor of Dermatology

HENRY HUN, M. D.
Professor of Diseases of the Nervous System

SAMUEL ROSEBURGH MORROW, M. D.
Professor of Practice of Surgery and of Orthopedic Surgery

HERMON CAMP GORDINIER, M. D.
Professor of Physiology

HOWARD VAN RENSSELAER, M. D.
Professor of Materia Medica and Therapeutics, and Adjunct
Professor of Theory and Practice of Medicine

*Died July 6, 1912.

JOSEPH DAVIS CRAIG, M. D.
Professor of Anatomy and Curator of the Museum

ANDREW MacFARLANE, M. D.
Professor of Physical Diagnosis and of Medical Jurisprudence

ARTHUR GUERNSEY ROOT, M. D.
Professor of Diseases of the Throat and Nose

LEO HAENDEL NEUMAN, M. D.
Professor of Gastro-Enteric Diseases, and Clinical Professor of
Theory and Practice of Medicine

ARTHUR WELLS ELTING, M. D.
Professor of the Practice of Surgery and of Clinical Surgery

EDGAR ALBERT VANDER VEER, M. D.
Professor of Abdominal and Clinical Surgery

JOHN ALBERTSON SAMPSON, M. D.
Professor of Gynecology

HARRY SAUL BERNSTEIN, M. D.
Professor of Pathology and Bacteriology

HERMAN BENDELL, M. D.
Clinical Professor of Otology

JESSE MONTGOMERY MOSHER, M. D.
Clinical Professor of Insanity, Neurology and Electro-
Therapeutics

HARRY JUDSON LIPES, M. D.
Clinical Professor of Obstetrics

ARTHUR SAUTTER, M. D.
Clinical Professor of Dermatology and Lecturer on Venereal
Diseases

GEORGE EMORY LOCHNER, M. D.
Clinical Professor of Obstetrics

CLEMENT FRANK THEISEN, M. D.
Clinical Professor of Diseases of Throat and Nose

HENRY LARNED KEITH SHAW, M. D.
Clinical Professor of Diseases of Children

SPENCER LYMAN DAWES, M. D.
Adjunct Professor of Materia Medica

LA SALLE ARCHAMBAULT, M. D.
Adjunct Professor of Neurology

ROBERT WOOD KEETON, M. S.
Adjunct Professor of Physiological Chemistry and Experimental
Physiology

WILLIAM OLIN STILLMAN, M. D.
Lecturer on History of Medicine

CHARLES HENRY MOORE, M. D.
Lecturer on Ophthalmology and Otology

JAMES FRANCIS ROONEY, M. D.
Lecturer on Hygiene, and Instructor in Medicine

HOWARD EATON LOMAX, M. D.
Lecturer on Anatomy and Demonstrator of Anatomy

GEORGE GUSTAVE LEMPE, M. D.
Lecturer on Minor Surgery

WILLIAM ATWOOD LARKIN, PH. G.
Assistant Registrar
Lecturer on Inorganic Chemistry and Instructor in Organic
Chemistry

JAMES NEWELL VANDER VEER, M. D.
Lecturer on Surgical Technic and Instructor in Genito-Urinary
Surgery

ARTHUR JOSEPH BEDELL, M. D.
Lecturer on Ophthalmology

JAMES WESLEY WILTSE, M. D.
Lecturer on Dermatology and Genito-Urinary Diseases

JOHN HENRY GUTMANN, M. D.
Lecturer on Surgery

JOSEPH LEWI DONHAUSER, M. D.
Lecturer on Surgical Diagnosis

ALVAH HARRY TRAVER, M. D.
Instructor in Surgery

CLINTON BENJAMIN HAWN, M. D.
Lecturer on Clinical Microscopy

CLINTON PRESTON McCORD, M. D.
Lecturer on Histology and Embryology

JOHN McWILLIAMS BERRY, M. D.
Lecturer on Radiography

LA VERNE ADELBERT BOUTON, M. D.
Instructor in Anatomy

WARDNER DANIEL AYER, M. D.
Instructor in Histology, Pathological Anatomy and Bacteriology

RALPH EMERSON MYERS, A. M.
Instructor in Pharmacology, Physiological Chemistry and
Physiology

EDGAR ROSCOE STILLMAN, M. D.
Instructor in Physiology

CHARLES KNICKERBACKER WINNE, JR., M. D.
Instructor in Theory and Practice

JOSEPH ALOYSIUS LANAHAN, M. D.
Instructor in Dermatology and Venereal Diseases

GEORGE EVERETT BEILBY, M. D.
Instructor in Surgical Pathology

BRANSEN KEEMPER DeVOE, M. D.
Instructor in Anatomy

EUGENE EUNSON HINMAN, M. D.
Instructor in Diseases of Throat and Nose

MALCOLM DOUGLAS, M. D.
Instructor in Physical Diagnosis and Therapeutics

ERASTUS CORNING, M. D.
Instructor in Theory and Practice, and Physical Diagnosis

LeROY SOLOMON BLATNER, D. D. S.
Instructor in Oral Pathology

WILLIAM KIRK, M. D.
Instructor in Anatomy and Physiology of the Nervous System

WALTER ANCEL REYNOLDS, M. D.
Instructor in Anatomy

JEROME MEYERS, M. D.
Instructor in Physical Diagnosis

RICHARD ANDREW LAWRENCE, M. D.
Instructor in Obstetrics

HAROLD PAYNE SAWYER, M. D.
Instructor in Clinical Microscopy

THEOBALD FREDERICK DOESCHER, M. D.
Instructor in Gastro-Enteric Diseases

NELSON KAUFMAN FROMM, M. D.
Instructor in Materia Medica

TIFFANY LAWYER, M. D.
Instructor in Gynecology

EDWIN LYON DRAPER, M. D.
Instructor in Surgical Pathology and Surgery

WILLIAM GEORGE KEENS, M. D.
Instructor in Diseases of Throat and Nose

HARRY HOUGHTON DRAKE, M. D.
Instructor in Anatomy and Clinical Assistant

JOSEPH AMBROSE COX, M. D.
Instructor in Obstetrics

JOSEPH LEWI BENDELL, M. D.
Instructor in Surgery

FREDERICK CHARLES CONWAY, M. D.
Instructor in Physical Diagnosis

JOHN FORREST SOUTHWELL, M. D.
Instructor in Surgery

PAUL TOMPKINS HARPER, M. D.
Instructor in Obstetrics

THOMAS WILLIAMS JENKINS, M. D.
Assistant Instructor in Histology

CHARLES WILLIAM LOUIS HACKER, M. D.
Assistant Instructor in Histology and Pathology

WALTER CLAYTON FOX, M. D.
Assistant Instructor in Pathology and Bacteriology

Clinical Assistants

WILLIAM H. GEORGE, M. D.	AGNES E. PAGE, M. D.
MICHAEL D. STEVENSON, M. D.	HARRY RULISON, M. D.
LOUIS HERBERT GAUS, M. D.	H. BURDETTE RIGGS, M. D.
ELIJAH HUDSON RIDER, M. D.	RALPH B. POST, M. D.
GEORGE W. PAPEN, JR., M. D.	WARD W. MILLIAS, M. D.
JOHN J. A. LYONS, M. D.	DANIEL F. O'KEEFFE, M. D.
WILLIAM GRANT LEWI, M. D.	JOHN L. EDWARDS, M. D.
MARTIN MACHARG, M. D.	DONALD A. MACDUFFIE, M. D.
LOUIS LEBRUN, M. D.	CHARLES H. PELTON, M. D.
JAMES MANNING MOORE, M. D.	ROYAL E. LAGRANGE, M. D.
GEORGE S. MUNSON, M. D.	MAX A. ALMY, M. D.
JOSEPH P. O'BRIEN, M. D.	ARTHUR H. STEIN, M. D.
MILES A. MCGRANE, M. D.	WILLIAM E. LOW, JR., M. D.
DANIEL V. O'LEARY, JR., M. D.	JOHN L. BOOTH, M. D.
JOSEPH H. BOWERS, M. D.	

CALENDAR

1912

Regular winter session begins.....Tuesday, September 24
 Election vacation.....Monday and Tuesday, November 4 and 5
 Thanksgiving vacation begins.Wednesday at 1 P. M., November 27
 Lectures resumed.....Monday morning, December 2
 Christmas vacation begins.....Monday morning, December 23

1913

Lectures resumed.....Monday morning, January 6
 Lincoln's birthday, lectures suspended...Wednesday, February 12
 Washington's birthday, lectures suspended..Saturday, February 22
 Commencement.....Tuesday, May 27

REQUIREMENTS FOR ADMISSION

All matriculates must secure 60 academic counts or their full equivalent, before beginning the first annual course counted toward the degree.

When all requirements are fulfilled, the regents issue a medical student certificate which the candidate must file with the registrar of the college.

Preliminary Examination. The preliminary examination of medical students is under the control of the Board of Regents of the University of the State of New York. Those contemplating the study of medicine should apply to the Examinations Division, University of the State of New York, Albany, by letter or otherwise, if information concerning this examination further than that given in the catalogue of the Medical College is desired. One of the examinations will be held in Albany, January 20-24, 1913.

Mid-Winter Written Examinations in all the departments are held before the Christmas vacation. A printed schedule of these examinations is furnished the class.

COURSE OF INSTRUCTION

The four-year graded course required of all candidates for the degree of Doctor of Medicine embraces the following subjects:

First Year

1. **Anatomy.** Three lectures; six hours osteology and dissection.
 2. **Inorganic Chemistry.** Two and a half lectures; four hours laboratory; one recitation.
 3. **Organic Chemistry.** Two lectures; one recitation.
 4. **Physiology.** Two lectures; one recitation; two and a half hours laboratory and demonstration.
 5. **Histology.** Five hours laboratory; one recitation.
 6. **Materia Medica.** Three lectures; two recitations.
- Lectures 12½; laboratory 9 hours; dissection and demonstration 8½ hours; recitations 6 per week.

Second Year

1. **Anatomy.** Two lectures; seven hours dissection and demonstration; two recitations.
2. **Anatomy and Pathology of Nervous System.** One lecture; two hours laboratory.
3. **Organic and Physiological Chemistry and Toxicology.** One and a half lectures; three hours laboratory; one recitation.
4. **Physiology.** One lecture; two and a half hours laboratory; one and a half recitations.

5. **Therapeutics.** One lecture; one-half recitation.
 6. **Theory and Practice.** Two lectures; one-half recitation.
 7. **Surgery (including Pathology).** Two hours laboratory; two lectures.
 8. **Bacteriology and Pathology.** Seven hours laboratory.
 9. **Physical Diagnosis.** One demonstration half the term.
 10. **Pharmacology.** One demonstration half the term.
- Lectures $10\frac{1}{2}$; dissections and demonstrations 8 hours; laboratory $16\frac{1}{2}$ hours; recitations $5\frac{1}{2}$ per week.

Third Year

1. **Theory and Practice.** Five lectures; three recitations; one hour clinics.
 2. **Clinical Microscopy.** Two and a half hours laboratory.
 3. **Therapeutics.** Two lectures; one recitation.
 4. **Electro-therapeutics.** One lecture half the term.
 5. **Obstetrics and Gynecology.** Three lectures.
 6. **Pediatrics.** Two lectures; one recitation half the term.
 7. **Neurology.** One lecture; one recitation half the term; one clinic.
 8. **Surgery (including operative, fractures, dislocations).** Six lectures; two recitations; three hours clinics.
 9. **Physical Diagnosis.** Section work two hours.
 10. **Medical Jurisprudence.** One lecture half the term.
 11. **Hygiene.** One lecture.
 12. **X Rays.** One demonstration half the term.
 13. **Obstetrical Histology and Pathology.** One hour laboratory.
 14. **History of Medicine.** One lecture half the term.
 15. **Ophthalmology.** One lecture.
- Lectures $22\frac{1}{2}$; laboratory $3\frac{1}{2}$ hours; demonstration $\frac{1}{2}$ hour; recitations 7; section work 2; clinics 5 per week.

Fourth Year

1. **Theory and Practice.** Three lectures; one recitation; two and a half hours clinics.
2. **Neurology.** One lecture; one clinic.
3. **Gynecology.** One lecture half the term.

4. **Obstetrics.** Two and a half lectures.
 5. **Surgery (including Orthopedics).** Four lectures; one recitation; three hours clinics.
 6. **Specialties.** One recitation.
 7. **Conferences.** One medical; one surgical.
 8. **Clinical section work.** Fourteen hours.
- Lectures 11; recitations 3; conferences 2; clinics $6\frac{1}{2}$; clinical section work 14 hours per week.

The order of instruction for the ensuing session will be found in the catalogue of the Medical College, and may be obtained by application to the registrar.

Laboratories

Practical Chemistry. The chemical laboratory is well furnished, conveniently arranged and supplied with all necessary apparatus. The laboratory course is preceded, since although some knowledge of chemistry is highly desirable none is now required at entrance, by a series of lessons upon chemical nomenclature, notation and the essential principles of theoretical chemistry, including the laws of combination and valence, and these subjects are therefore more briefly treated in the regular lecture course. The practical laboratory work includes tests for those metals and acids, which, in combination, are important as constituents of medicinal compounds or as poisons, together with the separation of the chief groups, volumetric analysis, the examination of unknown substances and toxicology. All chemical reactions are written upon the blackboards, discussed by the class, and entered upon their notes.

Experimental Physiology and Physiological Chemistry

The object of the course in practical physiology is to have the student formulate for himself ideas with regard to the normal working of the animal body. The laboratory work is introduced by an elementary consideration of the cell and its functions, ciliary motions, etc. This is followed by a detailed study of the phenomenon of contraction. The remainder of the first year is then devoted to a very careful consideration of the physiology of

digestion and nutrition. Among other things the physiological functions of the salivary, gastric, pancreatic and liver secretions are demonstrated and studied by means of artificial fistulae. The course is continued during the second year with a careful study of the circulation, respiration, and the physiology of the nervous system. Finally the attention of the class is directed to the physiological action of many of the more important drugs.

After the Christmas vacation the study of physiological chemistry is begun. Laboratory work in this subject consists in the isolation, preparation and identification by tests, of the various important proteins, fats and carbohydrates. The composition of the tissues and organs is next studied with special reference to secretion and excretion then receives attention in relation to the their most important constituents; the chemistry of digestion, several physiological processes involved. Finally there follows a thorough course in qualitative and quantitative urinalysis. The student is provided with a syllabus of the lectures and laboratory work and required to keep systematic notes of all lectures and experiments actually performed. The practical work is interspersed with lectures and recitations.

Anatomy

The dissecting, recitation and demonstration rooms are well lighted and equipped and an ample supply of carefully prepared material is available. An endeavor is made to make the entire course in anatomy practical, consistent and useful, and to assist the student in laying a broad foundation of anatomical knowledge on which to build future courses in didactic and clinical medicine and surgery.

Histology, Embryology, Pathology, Bacteriology and Clinical Microscopy

Work in these departments is carried on in the Bender Hygienic Laboratory, on Lake Avenue, near the Albany Hospital.

This building was erected by the late Matthew W. Bender of Albany, and is thoroughly equipped with the apparatus necessary for the study of histology, pathology, bacteriology and clinical

microscopy. Practical work in these branches is obligatory upon all students, and abundant opportunity is furnished in the laboratory for acquiring a thorough knowledge of these important subjects. An electric lantern which is adapted to the projection of pictures and microscopic preparations as well as lantern slides is used to supplement the more practical methods of demonstration.

Histology. The work consists of explanatory talks covering the subject of the day's study, followed by practical exercises in the laboratory.

Embryology. The star-fish egg is studied for early segmentation stages; gross and microscopic examination of a series of hen's eggs for formation of germ layers and development of the nervous and vascular systems. In a similar way the embryo of the pig is used for the development of the organs which is taken up again, according to the plan of Lewis, when each organ is studied histologically.

Bacteriology. The work consists of lectures followed by practical laboratory exercises. It is intended to render the student familiar with the underlying principles of bacteriology and their application to clinical medicine and surgery.

Pathology. The work consists of a short lecture on the subject under discussion for the day followed by practical exercises in pathological anatomy and histology. Besides this the students are instructed in the technique of making autopsies, and examine material from autopsies and surgical operations. Demonstrations in experimental pathology are introduced whenever possible.

Clinical Microscopy. The course consists of preliminary talks followed by practical work in the examination of blood, urine, sputum, faeces, stomach contents, exudates, etc.; and includes a short course in clinical bacteriology.

In all these courses the student is taught independent methods of work and is required to keep a permanent record, illustrated by drawings, of all laboratory exercises.

A limited number of students who have shown proper aptitude are offered the opportunity to work along more advanced lines.

For the alumni of this school, and for physicians in the vicinity,

this laboratory offers excellent facilities for bacteriological and pathological examination of specimens, and for the examination of urine, sputum, and blood, including the Wassermann-Noguchi reaction. Information regarding such examinations may be obtained by communicating with Dr. H. S. Bernstein, Director, Bender Laboratory, South Lake avenue, Albany.

Practical Clinical Courses

In order to familiarize students with the practical work of their profession, and to bring them into closer personal contact with patients, the fourth year class is divided into sections of eight or ten men, and on four days in each week each man devotes several hours to the examination and personal observation, under the supervision of the instructors, of patients in the wards and out-patient departments of the various hospitals and dispensaries. In this clinical work special attention is devoted to the complete examination of the blood, urine, sputum and stomach contents, as well as to the special examination of the eye, ear and other organs. Thus in the course of the school year the men in each section acquire practical knowledge and technical diagnostic dexterity in general medicine, general surgery, dermatology, neurology, insanity, otology, laryngology, ophthalmology, rhinology, diseases of children and infants, infant feeding, diseases of the rectum and genito-urinary tract, operative surgery, orthopedic surgery, operative obstetrics, electro-therapeutics and medical technic.

FEES AND EXPENSES

Fees, excepting the final examination fee, are payable each year in advance, are not returnable, and are as follows:

First Year

Matriculation	\$5 00
Lecture Course	100 00
Chemical Laboratory	10 00
Histological Laboratory	10 00
Dissection (including material)	10 00
	\$135 00

Second Year

Matriculation	\$5 00	
Lecture Course	100 00	
Dissection (including material)	10 00	
Bacteriological and Pathological Laboratory..	15 00	
Physiological Chemistry and Experimental Pathology	15 00	
		\$145 00

Third Year

Matriculation	\$5 00	
Lecture Course	100 00	
Clinical Microscopy, Surgical and Obstetrical Pathology	15 00	
		\$120 00

Fourth Year

Matriculation	\$5 00	
Lecture Course	100 00	
Final examination	25 00	
		\$130 00

In addition to the fees above stated, an annual charge of two dollars is made to members of the first, second and third year classes taking laboratory courses at the Bender Laboratory, for the use of microscopes and other apparatus. This fee is paid to the director at the laboratory, and after laboratory tickets have been issued by the registrar. For the laboratory work in physiological chemistry there is a fee of two dollars to cover use of apparatus and breakage payable to the director at the beginning of the session. There is also a fee of five dollars paid by members of the fourth year class to the Guild for the Care of the Sick for the course in practical obstetrics.

All fees are payable strictly in advance except that the final examination fee may be paid at any time before the examinations begin. Graduates of the school may attend lectures and stated clinics without charge except for matriculation in case of prolonged attendance.

The cost of living in Albany is less than in most other cities of its size. The janitor of the college keeps a list of boarding houses at which good rooms and board can be obtained at from

four to five dollars a week or upwards, and by clubbing together students can live comfortably at still lower rates. No estimate can well be made of cost of text-books and other personal expenses since those of necessity vary greatly in different cases.

REQUIREMENTS FOR GRADUATION

The candidate must be twenty-one years of age, and exhibit a certificate from a physician or surgeon, duly authorized by law to practice his profession, that he has studied medicine and surgery under his instruction during the period required by law in this state, and he must present evidence of having complied with the law concerning preliminary examination.

He must have attended not less than four regular courses of lectures, of which the last shall have been at this college.

Students who have attended one or more courses of lectures at other recognized medical colleges may be admitted to advanced standing in this college if they submit proper evidence of such attendance and a precise statement of subjects included in Examination Departments, as given in the Medical College Catalogue, in which satisfactory final examinations have been passed, and comply with the requirements stated under Examination Rules. No credit will be given for work done elsewhere in the fourth year departments.

He must be of good moral character.

He must maintain a satisfactory standing during his course and pass a satisfactory final examination in the several branches taught.

Regular and punctual attendance is required, and matriculation tickets are endorsed with attendance at the end of the term.

For catalogues or further information, address

WILLIS G. TUCKER, M. D., *Registrar*,
Albany, New York.

ALBANY LAW SCHOOL

This school is among the oldest institutions of the kind in the country, having been established in 1851, and its graduates number many of the most successful men in the profession. It is and has been largely represented in the executive, judicial and legislative departments of this and many other states, as well as of the federal government. It became a part of Union University in 1873, and begins its sixty-third year as a law school with the present scholastic year. During its long and successful career it has, in common with other law schools, done much to demonstrate what was at one time doubtful, but is now accepted almost as an axiom, that a course at the law school is a well-nigh necessary prerequisite to a successful professional career. Its instructors have always been men of repute and standing, both for professional learning and personal character.

The local advantages of the city of Albany, as the seat of a professional school, can not be overrated. It is the capital of one of the leading states in the Union, whose legislature is in session here for the third part of the year, presenting opportunities not afforded by any other law school in the state for observing the methods and procedure collectively of the executive, judicial and legislative departments of the state government. The knowledge thus obtained by the students at law, who are to complete their course and to enter the realm of public affairs, can not be overestimated. It is easily accessible, remarkably healthful, and the scene of great business and professional activity. It is large enough to afford its inhabitants all the means of culture and recreation naturally to be looked for in a city, while it is not so large as to make the cost of living burdensome, even to persons of extremely limited means.

The facilities afforded the students for reading and study are unsurpassed. Besides the convenient and well chosen library of the school accessible to the students at all hours of the day and evening, the students have the privilege of using the state law library, which is now established in the New Education Building. With free access to these libraries the student may be relieved to a great extent from purchasing text-books.

TRUSTEES**President**

AMASA J. PARKER

Vice-President

SEYMOUR VAN SANTVOORD

Secretary

CHARLES J. BUCHANAN

Treasurer

A. PAGE SMITH

MARCUS T. HUN

ALTON B. PARKER

J. NEWTON FIERO

CHARLES C. LESTER

DANFORTH E. AINSWORTH

IRVING G. VANN

D. CADY HERRICK

THOMAS H. HUBBARD

JAMES F. TRACEY

FREDERICK W. CAMERON

CHARLES A. RICHMOND

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Chancellor of the University

J. NEWTON FIERO, LL. D.

Dean

Lecturer on the Law of Procedure, Equity, Torts, Evidence, Wills

LEWIS R. PARKER

Professor of the Law of Bailments, Bills and Notes, Guaranty
and Suretyship, and Constitutional Law

FLETCHER W. BATTERSHALL

Professor of Persons and Property, Domestic Relations, Partner-
ship

FRANK WHITE

Professor of the Law of Corporations

GEORGE LAWYER

Professor of the Law of Contracts, Personal Property and Sales,
Bankruptcy

FRANK B. GILBERT

Professor of the Law of Real Property, Statutes and Statutory Construction

JACOB C. E. SCOTT

Professor of Criminal Law.

FREDERICK W. CAMERON

Professor of the Law of Patents, Copyright, and Trade-Marks

CHARLES J. HERRICK

Professor of Civil Law, International Law, and Conflict of Laws

HON. IRVING G. VANN, LL. D.

Lecturer on Insurance

HON. ALDEN CHESTER

Lecturer on the Federal Judicial System

FREDERICK D. COLSON

Lecturer on Books and Their Uses

JOHN C. WATSON

Registrar

Hubbard Chair of Legal Ethics. The circulars of seventy of the leading law schools of the country show that a very few years ago only twenty of this number made the subject of legal ethics part of the curriculum. With two exceptions, those schools were either in the west or south. These facts led Gen. Thos. H. Hubbard, class of '60, to place at the disposal of the board of trustees the sum of \$10,000, the income to be applied to lectures upon this subject. The board of trustees decided to inaugurate the course at the opening of the school year of 1903 and twenty-five Lectures by as many distinguished Judges and Lawyers have been delivered up to this time.

CALENDAR

1912

Registration, first semester.....Tuesday, September 17
 Scholastic year begins.....Wednesday, September 18
 Election day recess.....Tuesday, November 5
 Thanksgiving recess begins, noon.....Wednesday, November 29

Lectures resumed Tuesday, December 3
 Holiday recess begins, noon.....Friday, December 20

1913

Lectures resumed Monday, January 6
 McKinley day Wednesday, January 29
 Examinations.....Thursday-Friday, January 30-31
 Registration, second semester.....Monday, February 3
 Washington's birthday.....Saturday, February 22
 Good Friday, recess.....Friday, March 21
 Examinations.....Wednesday-Thursday, May 28-29
 Memorial Day, recess.....Friday, May 30
 Commencement.....Thursday, June 5

REQUIREMENTS FOR ADMISSION AND GRADUATION

The course for graduation is now three years. Candidates for graduation from this school will be required (1) to present evidence of a general preliminary education representing at least four years, or their equivalent, of work of a grade above the elementary or grammar school before beginning the course of study; (2) to have studied law at least three full years for the degree of LL. B., each school year of which shall consist of not less than thirty-two school weeks, exclusive of vacations, in which not less than ten hours of attendance upon law lectures or recitations of such prescribed course to be given or conducted by regular members of the faculty are required in each week, unless admitted to advanced standing of one year on graduation from a registered college or university; (3) to complete the course in residence of not less than one year; (4) to be of good moral character; (5) to be at least twenty-one years of age.

EXPENSES

Matriculation fee, on entrance.....	\$10
Tuition, each year.....	110
Graduation fee	10

For catalogues or further information address

JOHN C. WATSON, *Registrar*

Albany Law School,

Albany, N. Y.

THE DUDLEY OBSERVATORY

The Dudley Observatory is located on Lake avenue, in the southwestern part of Albany, to which site it was removed in 1893 from its former location in the northern part of the city. It is devoted to original research in astronomy, according to the purpose of its founder and successive patrons. Its contributions to science are represented in two volumes of *Annals* and in other published volumes and memoirs contained in the transactions of learned societies and astronomical journals. Its principal line of work at present is the determination of problems relating to the positions and motions of the stars and of the solar system as a whole.

The instrumental equipment of the observatory is designed for the purposes of exact measurement in line with its chosen work. In the tower of the main building is the Pruyn equatorial, with object-glass twelve inches in diameter. This instrument is equipped both for visual and photographic use, and is of a high order of mechanical perfection. The Olcott meridian circle is located in a separate building, especially designed for securing the utmost equality in the temperature between the external air and that in the building itself. Its object-glass is eight inches in diameter. It was made by Pistor and Martins, of Berlin, and is regarded by astronomers as a masterpiece of accurate workmanship. This instrument has been employed for many years in obtaining the measurements necessary for the construction of the numerous and elaborate star catalogues which have issued from the Dudley Observatory. In addition to these instruments, the observatory is in possession of various small telescopes, clocks, chronographs and smaller apparatus.

The institution is supported by an endowment, chiefly contributed by Mrs. Blandina Dudley, the late Catharine W. Bruce, and Hon. Frederic P. Olcott, as well as by appropriations which have been received from the National Academy of Sciences, and from current contributions of trustees and friends of the institution. Since 1902, annual grants have been made to the director of the observatory by the Carnegie Institution of Washington. These have been sufficient to provide for the entire force of assistants and computers now employed. In 1905, the Carnegie Institution made special provision for carrying on the star researches upon which the observatory is engaged for a period of ten years. This includes an appropriation which enabled the observatory to send the Olcott meridian circle to the southern hemisphere for two years

with an ample force of observers, in order to carry out an essential feature of its investigations.

The Dudley Observatory is not designed to give general instruction in astronomy, though special students contemplating instruction in professional lines have been received from time to time under an arrangement of computing service to the observatory.

The observatory is opened to visitors on Tuesday evening of each week from 8 to 10 o'clock.

For further particulars apply to

BENJAMIN BOSS, Acting Director

TRUSTEES

President

SAMUEL B. WARD, M. D., PH. D.

Vice-President

WILLIAM H SAGE

Treasurer

DUDLEY OLCOTT

Secretary

BENJAMIN BOSS

CLARENCE RATHBONE
GRANGE SARD
J. TOWNSEND LANSING
HENRY HUN
GEORGE G. DAVIDSON
BENJAMIN W. ARNOLD

JAMES F. COOPER
OSCAR L. HASCY
WILLIAM G. RICE
ROBERT C. PRUYN
CHARLES A. RICHMOND
ANDREW S. DRAPER

STAFF

Acting Director

BENJAMIN BOSS

Secretary

.....

Assistants

ARTHUR J. ROY, C. E., A. M.	WILLIAM B. VARNUM, A.B.
HARRY RAYMOND, A. B.	MEADE L. ZIMMER, A. B.
LEROY JENKINS, A. B.	SHERWOOD B. GRANT, C.E.

ALBANY COLLEGE OF PHARMACY

The Albany College of Pharmacy was created by act of the board of governors of Union University, June 21, 1881, and constitutes the department of pharmacy of Union University. It was incorporated as the Albany College of Pharmacy, August 27, 1881. The college is centrally located at 43-45 Eagle street.

TRUSTEES

President

CHARLES NEWMAN

Vice-President

CHARLES GIBSON

Treasurer

JOHN M. BIGELOW

Secretary

ALFRED B. HUESTED

ExOfficio

WILLIS G. TUCKER

SAMUEL B. WARD

ARTHUR L. ANDREWS

EDWARD N. MCKINNEY

OTTO SCHOLZ

CHARLES A. RICHMOND

GUSTAVUS MICHAELIS

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor of the University

WILLIS GAYLORD TUCKER, M. D., PH. D.
Dean
Professor of Chemistry and Toxicology

ALFRED BIRCH HUESTED, M. D., PH. G.

Secretary

Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.

Emeritus Professor of Pharmacy

GARRET VANDER VEER DILLENBACK, PH. G.

Associate Professor of Pharmacy

EDWIN CUNNINGHAM HUTMAN, PH. G.

Director of Pharmaceutical Laboratory

WILLIAM ATWOOD LARKIN, PH. G.

Adjunct Professor of Chemistry and Physics

SPENCER LYMAN DAWES, M. D.

Director of Microscopical Laboratory

JARED WATERBURY SCUDDER, A. M.

Instructor in Latin

WARREN LANSING BRADT, PH. G.

Lecturer on Pharmaceutical Jurisprudence

WILLIAM WALKER GIBSON, B. A., PH. G.

Instructor in Commercial Pharmacy

HARRY EUGENE ROBIE, PH. G.

Instructor in Pharmacy and Mathematics

HARRY WHEELER BAKER, PH. G.

Instructor in Pharmacy

RICHARD BERCHMANS GRAY, M. D.

Assistant in Microscopical Laboratory

CALENDAR FOR 1912-13

1912

Opening exercises.....Monday, October 7
Examinations to pass off conditions.....Monday, October 7
Christmas vacation, begins.....Monday, December 23

1913

Exercises resumed.....Monday, January 6
Commencement.....Tuesday, April 29

REQUIREMENTS FOR ADMISSION

All applicants for admission to regular standing in this college must be at least seventeen years of age, and will be required to

present a Pharmacy Student Certificate issued by the New York State Education Department. The requirement for this certificate is the completion of the first year's course in a recognized high school or academy, or evidence of an equivalent education. Inquiries concerning this preliminary requirement may be addressed to the New York State Education Department, Albany, New York.

THE CURRICULUM

The curriculum of the college embraces:

Chemistry—Theoretical, general, pharmaceutical and analytical

Botany—Structural, systematic and analytical

Materia Medica and Pharmacognosy

Pharmacy—Theoretical and Practical

Microscopy—Theoretical and practical in its relation to pharmacy

Toxicology

Pharmaceutical Mathematics

Physics

Physiology

Latin

Pharmaceutical Jurisprudence

Commercial Pharmacy

GRADUATION

The diploma of this college confers the degree of Graduate in Pharmacy (Ph. G.). Applicants for this degree must have had the required preliminary education, be of good moral character, have attended two full courses in this college, or the last course in this college and the first in some other registered college of pharmacy; have passed satisfactory examinations and paid all fees as hereafter stated.

FEES FOR TUITION

EACH YEAR	
Matriculation	\$5 00
Tuition.	85 00

SITUATIONS

Students desirous of obtaining employment while attending college will be assisted as far as possible in securing situations, but employment cannot be promised in advance, and places cannot be secured by correspondence. During the past several years the faculty has had a much larger number of openings offered for graduates to lucrative positions than it has been able to fill. The demand on the part of the employers for skilled assistants is steadily increasing, and a college diploma or license from an examining board is demanded by law of those who engage in the practice of pharmacy in most of the states and cities of the Union.

For separate catalogue giving more complete information address

ALFRED B. HUESTED, *Secretary*
43-45 Eagle street
Albany, N. Y.

ENROLLMENT, UNION UNIVERSITY, 1912-13

STUDENTS OF UNION COLLEGE

Abbreviations

c, A. B. course; *ls*, Ph. B. course; *s*, B. S. course; *e*, B. E. course in general engineering; *se*, B. E. course in sanitary engineering; *ee*, B. E. course in electrical engineering; N. S., North Section; M. S., Middle Section; S. S., South Section; N. C., North College; S. C., South College.

An asterisk (*) before a student's name indicates that he has not been advanced in standing with his class.

Candidates for the Degree of Master of Arts

Michael William Bray, A. B.....	<i>Churubusco</i>
Samuel M. Cavert, A. B.....	<i>Ballston Spa</i>
Frederick T. Dawson, Litt. B.....	<i>Union College</i>
George M. Elmendorf, Ph. B.....	<i>Herkimer</i>
Paul J. Hagar, A. B.....	<i>Tarrytown</i>
Neilson C. Hannay, A. B.....	<i>Troy</i>
Edward F. Hennelly, A. B.....	<i>Schenectady</i>
Edward B. Irish, A. B.....	<i>New Brunswick, N. J.</i>
Arthur L. Maxon, A. B.....	<i>Union College</i>
Roy H. McCormack, A. B.....	<i>Madison, N. J.</i>
Fred F. McGauley, B. S.....	<i>Schenectady</i>
Floyd Leslie Miller, Ph. B.....	<i>Schenectady</i>
Ross Williams Tiffany, B. S.....	<i>Newburgh</i>
Charles N. Waldron, B. S.....	<i>Union College</i>
Otto J. Walrath, B. S.....	<i>Bloomfield, N. J.</i>
Kenneth B. Walser, A. B.....	<i>Essex Falls, N. J.</i>
James Bell Welles, A. B.....	<i>Elmira</i>
Chauncey H. Winters, A. B.....	<i>Schenectady</i>

Candidates for the Degree of Master of Civil Engineering

Harold W. Baker, B. E.....*Oneida*
 Tulloch McC. Townsend, B. E.....*Schenectady*

Graduate Students

James H. Cunningham, M. E. E. *Schenectady*, 333 Glenwood Blvd.
 Candidate for the degree of Doctor of Philosophy
 Olin J. Ferguson, M. E. E. *University of Nebraska*, Lincoln, Neb.
 Candidate for the degree of Doctor of Philosophy
 Wilbert A. Garrison, A. M. *Schenectady*, 99 Van Vranken Ave.
 Candidate for the degree of Doctor of Philosophy
 Morland King, M. E. E. *Schenectady*, Union College
 Candidate for the degree of Doctor of Philosophy
 Frank William Peek, Jr., M. E. E. *Schenectady*, N. Wendell Ave.
 Candidate for the degree of Doctor of Philosophy

Seniors, Class of 1913

ls Chatfield Terry Bates.....*Schenectady*.....X Ψ Lodge
ee Raymond Hilton Bond.....*Washington, D. C.* 103 Nott Ter.
**e* Edwin Purdy Bouton.....*Trumansburg*.....22 Park Place
ee James Ransom Braman.....*Port Chester*.....Θ Λ Φ House
ee Charles Francis Brate.....*Albany*.....N. S. N. C.
ee Clarence Nicholls Bridge.....*Charlevoix, Mich.* Pyramid Club
e Franklin H. H. Bryere.....*Raquette Lake*.....Pyramid Club
e Charles Heber Carlisle.....*Greenville, S. C.* 135 Van V. Ave.
**ee* Frederick Miller Champion.....*Clinton*.....Φ Δ Θ House
ls Giles Davis Clark.....*Albany*.....21 Park Place
ee Kenneth P. Conover.....*Amsterdam*.....Pyramid Club
e John C. Cronin.....*Glens Falls*.....Θ Λ Φ House
s Henry Bryan Daly.....*Hudson Falls*.....Φ Γ Δ House
s Harry Lee Davenport.....*Scotia*....1 Mohawk Ave., Scotia
ls Norman Alexander Davis.....*Warren, Pa.*.....Φ Γ Δ House
s Hartley Greaves Dewey.....*Schenectady*.....B Θ Π House
ls Harold H. Dickinson.....*Buffalo*.....Σ Φ Place
ee Neville Sawrey Dickinson.....*De Land, Fla.* 146 Brandywine

<i>c</i>	Alexander Galt Duane.....	<i>New York City</i>	Σ Φ Place
<i>c</i>	David Roy Finley	<i>Geneseo</i>	Ψ T House
<i>ee</i>	Clarence Root Fischle.....	<i>Buffalo</i>	B Θ Π House
<i>e</i>	Herman Franck, Jr.....	<i>Schenectady</i>	831 Grant Ave.
<i>ee</i>	John Henry Gardner, Jr.....	<i>Meadowdale</i>	X Ψ Lodge
<i>e</i>	Paul Giddings	<i>Corfu</i>	Pyramid Club
<i>ee</i>	Ernest T. Gilbert.....	<i>Binghamton</i>	N. S. N. C.
<i>ee</i>	Lansing J. Gilmore.....	<i>Salem</i>	Pyramid Club
<i>m</i>	Clarence Wilson Hall.....	<i>Luzerne</i>	Φ Δ Θ House
<i>e</i>	Richard Keese Hallock.....	<i>Stamford</i>	K. A. Lodge
<i>ls</i>	Theodore William Hanigan....	<i>Schenectady</i>	938 State St.
<i>c</i>	Frederick Staley Harris.....	<i>Peekskill</i>	Δ Φ House
<i>s</i>	Don King Hutchens.....	<i>Pulaski</i>	A Δ Φ House
<i>ee</i>	Nugihalli Narasimha Iengar....	<i>Bengalore, India</i>	N. S. N. C.
<i>e</i>	Joseph Kirchenbaum	<i>Schenectady</i>	347 Maxon Road
<i>s</i>	Robert Francis La Barron....	<i>Binghamton</i>	Δ T House
<i>e</i>	Richard Perkins Lent.....	<i>Highland</i>	Φ Δ Θ House
<i>e</i>	William Johnson Lewis.....	<i>North Troy</i>	K A House
<i>ee</i>	Russell Edmund Lowe.....	<i>New York City</i>	A Δ Φ House
<i>e</i>	Charles Thomas Male.....	<i>Niskayuna</i>	Pyramid Club
<i>c</i>	Hubert Mann	<i>Schenectady</i> ...	37 Glenwood Blvd.
<i>s</i>	Thomas Marion Marshall.....	<i>Yonkers</i>	K A Lodge
<i>ee</i>	Charles F. Masterson.....	<i>Barton</i>	Ψ T House
<i>ls</i>	Stephen Lorenzo Mayham.....	<i>Schoharie</i>	Δ Φ House
<i>e</i>	Leland Rea McKnight.....	<i>Salem</i>	Pyramid Club
<i>*e</i>	Paul Carney McQuaid.....	<i>Webster, Mass</i>	B Θ Π House
<i>e</i>	George Stanley Meikle.....	<i>Schenectady</i>	The Mynderse
<i>*c</i>	Joseph Patrick Mohair.....	<i>Newton, N. J.</i>	Pyramid Club
<i>s</i>	Robert Fortney Payne.....	<i>Schenectady</i> ...	242 Parkwood Blvd.
<i>ee</i>	Carlos Pires Pontual.....	<i>Sao Paulo, Brazil</i> ...	III Nott Ter.
<i>*ee</i>	Philip Noyes Riedinger.....	<i>Elmira</i>	Ψ T House
<i>ls</i>	William Alexander Rogers....	<i>Yonkers</i>	Σ Φ Place
<i>e</i>	James M. Roshirt.....	<i>Albany</i>	Pyramid Club
<i>ee</i>	John Atwood Royce.....	<i>Liberty</i>	Δ T House
<i>e</i>	Isidor Schulman	<i>Schenectady</i>	36 Foster Ave.
<i>*e</i>	John Joseph Shea, Jr.....	<i>Albany</i>	739 Nott St.
<i>ls</i>	M. Sutphen Somers.....	<i>Johnstown</i>	Δ Φ House

ee	Konrad Stern	Clinton	Pyramid Club
ee	Hugh Montgomery Stoller	Schenectady	X Ψ Lodge
se	Walter von Dohlen Tiedeman	Schenectady	Φ Δ Θ House
c	Van Rensselaer Tremper	Albany	A Δ Φ House
e	Franklin Peter Ulrich	Scotia	Scotia
ee	Clyde Dirwain Utter	Oneonta	405 Union St.
ee	George Stuart Van Antwerp	Johnstown	North Colonnade
e	Carl E. Vedder	Schenectady	Pyramid Club
s	Milton George Wend	Albany	Φ Γ Δ House
ee	Douglas Weare Whitney	Chicago, Ill.	X Ψ Lodge
s	Roy Cameron Whitney	Oswego	Φ Γ Δ House
Seniors—66			

Juniors, Class of 1914

ee	C. Harry Anderson	Olean	Pyramid Club
e	David Percy Anderson	Pocantico Hills	B Θ Π House
ee	James Vincent Baker	Port Chester	B Θ Π House
se	Carlton M. Baldwin	Glens Falls	Pyramid Club
e	Frank Dorn Barclay	Schenectady	B Θ Π House
s	Sidney William Bisgrove	Schenectady	Pyramid Club
e	George Sumner Bradford	S. Gardner, Mass.	Pyramid Club
*e	John H. Burwell, Jr.	Saratoga	Φ Γ Δ House
e	Louis Chester Case	Guilderland	Ψ T House
s	Riley Hamilton Coons	Burnt Hills	Ψ T House
ls	William Lawrence Coté	Lake George	616 Terrace Place
ee	Leon Elisha Decker	South Fallsburg	Θ Δ Φ House
e	Sidney Ferdinand Dejonge	Tompkinsville	K A Lodge
ee	Louis du Bois De La Vergne	Kingston	A Δ Φ House
ee	Nicholas Diamantides	Constantinople, T.	104 Park Ave.
*ee	Eli Sarkis Eghian	Beyrouth, Syria	N. S. N. C.
e	Cyrus Bruce Elmore	Middletown	B Θ Π House
s	Thomas Leland Ennis	Rotterdam Junction	A Δ Φ House
ee	Richard William Evans	Fergus Falls, Minn.	X Ψ Lodge
s	Harry Clarkson Ewens	Buffalo	A Δ Φ House
ee	Pedro Ferraz Netto	Sao Paulo, Brazil	Δ Φ House
se	Eugene D. Filmer	Gloversville	Pyramid Club

*e	Myron J. Folensbee.....	<i>Schenectady</i> ...	Δ	Υ	House	
ee	Ernest Allen Fox.....	<i>Gloversville</i>	B	Θ	Π	House
s	DeForest Van Slyck Garnsey...	<i>Schenectady</i>	K	Α	Lodge	
ee	J. Gordon Gidley.....	<i>Johnstown</i>	Δ	Φ	House	
ee	Harold Duane Godfrey.....	<i>Rosebank</i>	K	Α	Lodg	
se	Harrison Gunning.....	<i>Freeport</i>	Ψ	Υ	House	
c	Jerome D. Guthmann.....	<i>Schenectady</i>	5		Parkwood Blvd	
ee	Luther Alfred Hagar.....	<i>Plattsburgh</i>	B	Θ	Π	House
ee	Albert Ives Hall.....	<i>Saratoga</i>	Θ	Α	Φ	House
ee	John Alden Hall.....	<i>Washington, D. C.</i>	103		Nott Ter.	
s	Arthur Leopold Hawley.....	<i>Schenectady</i>	Α	Δ	Φ	House
c	Henry Herman Hitchcock.....	<i>Cambridge</i>	Δ	Υ	House	
s	John Taylor Howell, Jr.....	<i>Newburgh</i>	X	Ψ	Lodge	
ee	Bert M. Hubbard.....	<i>Schenectady</i>			Pyramid Club	
s	Charles Albion Kenworthy.....	<i>Amsterdam</i>	Ψ	Υ	House	
e	John Porter Lacey.....	<i>Highland</i>	Φ	Δ	Θ	House
e	George Edward Lewis, Jr.....	<i>Marion</i>	Φ	Δ	Θ	House
ee	John Vrooman Lewis.....	<i>Hammondsport</i> ...	B	Θ	Π	House
e	Arthur Loeb	<i>Schenectady</i>	105		Seward Place	
e	George William Lutz.....	<i>Schenectady</i> ...	914		Delamont Ave.	
ee	Albert Horace Marcott.....	<i>Randolph, Vt.</i>			North Colonnade	
e	Andrew Stanton McCormick....	<i>Boonville</i>			Pyramid Club	
s	Alfred Cluett Meneely.....	<i>Watervliet</i>	Α	Δ	Φ	House
ee	Domingos Luciros de Moraes....	<i>Sao Paulo, Brazil</i>	704		South Ave.	
ee	Ralph D. Morgan.....	<i>Buffalo</i>	Δ	Υ	House	
s	William Alvin Mudge.....	<i>Schenectady</i>			Pyramid Club	
e	Harry Froass Naumann.....	<i>Oneida</i>	Ψ	Υ	House	
c	Ernest Passage	<i>Schenectady</i>	244		McClellan St.	
s	Dalton Vane Sarvey.....	<i>Elmira</i>	Ψ	Υ	House	
*s	Morris P. Schaffer.....	<i>Schenectady</i> ...	924		Delamont Ave.	
ee	LeRoy Sand Schell, Jr.....	<i>Schenectady</i>	1103		State St.	
c	John Sherburne, 2nd.....	<i>Amsterdam</i>	Φ	Γ	Δ	House
s	Arthur Daniel Sherman.....	<i>Albany</i>			North Colonnade	
*s	Charles Sherman	<i>Albany</i>	K	Α	Lodge	
ee	Carlos Moreira da Silva.....	<i>Estado de Rio, Brazil</i>			S. S. S. C.	
ee	Walter C. Smith.....	<i>Lynchburg, Va.</i>			Pyramid Club	
e	Stephen Bond Story.....	<i>Vernon, Conn.</i>	Ψ	Υ	House	
se	Archibald Scott Telfer.....	<i>Hartwick</i>	Φ	Δ	Θ	House

<i>e</i>	Homer Michael Tinklepaugh.....	<i>Sodus</i>	Φ Δ Θ	House
<i>c</i>	George Octavius Truex.....	<i>Bolton Landing</i>	Θ Λ Φ	House
<i>c</i>	Raymond Van Santvoord.....	<i>Cohoes</i>	Ψ Τ	House
<i>ee</i>	Roblee Hamilton Vaughan.....	<i>Saratoga</i>	Δ Φ	House
<i>s</i>	Warren Chase Vosburgh.....	<i>Voorheesville</i>	Θ Λ Φ	House
<i>ee</i>	George Wadsworth	<i>Buffalo</i>	A Δ Φ	House
<i>e</i>	J. Bernard Wallace.....	<i>Schenectady</i>	353	McClellan St.
<i>ee</i>	Stanley Lincoln Walworth.....	<i>Binghamton</i>	A Δ Φ	House
<i>ee</i>	James Robert West.....	<i>Sodus</i>	Φ Δ Θ	House
<i>s</i>	Morgan L. Williams.....	<i>Medway</i>	5	Gillespie St.

Juniors—70

Sophomores, Class of 1915

<i>c</i>	Karl Engle Agan.....	<i>Port Henry</i>	Δ Τ	House
<i>e</i>	Luiz P. de Almeida.....	<i>Sao Paulo, Brazil</i>	N.	Colonnade
<i>e</i>	Raymond Barteau Arthur.....	<i>Brooklyn</i>	Θ Λ Φ	House
<i>c</i>	Harry Floyd Bain.....	<i>Argyle</i>		Pyramid Club
<i>s</i>	Walter C. Baker.....	<i>Oneida</i>	Ψ Τ	House
<i>e</i>	Wesley Hinson Baldy.....	<i>Buffalo</i>	Δ Τ	House
<i>s</i>	David John Beaver.....	<i>Schenectady</i>	849	Albany St.
<i>s</i>	Jacob Julius Beaver.....	<i>Schenectady</i>	849	Albany St.
<i>s</i>	Raymond Stewart Blodgett.....	<i>Jefferson</i>		Pyramid Club
<i>c</i>	Albert Ralph Boomhower.....	<i>Plattsburgh</i>	Ψ Τ	House
<i>e</i>	Ralph Emmons Boyce.....	<i>Nassau</i>	Θ Λ Φ	House
<i>e</i>	Charles Valentine Brewster.....	<i>Schenectady</i>	Δ Τ	House
<i>*e</i>	Harry Augustus Buckley.....	<i>Plattsburgh</i>	Θ Λ Φ	House
<i>*e</i>	Urbano de Moraes Bueno, Jr....	<i>Sao Paulo, Brazil</i>	III	Nott Ter.
<i>e</i>	Antonio F. de A. Cavalcanti.....	<i>Sao Paulo, Brazil</i>	N.	Colonnade
<i>ls</i>	Ambrose M. Clark.....	<i>Schenectady</i>	Σ Φ	Place
<i>e</i>	Prescott Coyle Cleveland.....	<i>Jamaica</i>	Ψ Τ	House
<i>e</i>	Rodrigo M. de B. Conceição....	<i>Sao Paulo, Brazil</i>	M. S. S. C.	
<i>e</i>	Stephen Joseph Costello.....	<i>Schenectady</i>	706	South Ave.
<i>c</i>	Donald A. Coulter.....	<i>Schenectady</i>	3	Regent St.
<i>e</i>	Edward Peck Culver.....	<i>Hudson Falls</i>	Ψ Τ	House
<i>e</i>	Fred Dales Cure.....	<i>Pine Hill</i>	Δ Τ	House
<i>e</i>	Harold John Delchamps.....	<i>Mobile, Ala</i>	X Ψ	Lodge
<i>ls</i>	Thomas Ashley Dent, Jr.....	<i>Pelham Manor</i>	A Δ Φ	House

e	Archibald Hastie Dick, Jr.....	<i>Schenectady</i>	133 Park Ave.
ls	Edward Rice Doyle.....	<i>Buffalo</i>	Φ Γ Δ House
c	Robert Livingston Duane.....	<i>New York City</i>	Σ Φ Place
*e	Lennis W. Dunbar.....	<i>Gloversville</i>	Δ Φ House
s	Henry Louis Faust.....	<i>Schenectady</i>	A Δ Φ House
e	William John Fisher.....	<i>Buffalo</i>	Pyramid Club
*c	James Leo Fitzgerald.....	<i>Ilion</i>	21 Park Place
e	Samuel Henry Frankel.....	<i>Schenectady</i>	234½ So. Ferry St.
ls	Lewis Arms Gilbert.....	<i>Newark</i>	B Θ Π House
*c	Wesson Mosher Goodsell.....	<i>Oneonta</i>	Δ Υ House
e	John Jacob Guerard.....	<i>Flat Rock, N. C.</i>	Δ Φ House
s	George Streeter Hackney.....	<i>Johnstown</i>	Δ Φ House
e	Howard Snow Hawn.....	<i>Ravena</i>	Φ Δ Θ House
e	Lynde De Forest Hokerk.....	<i>Richfield Springs</i>	Δ Υ House
s	Ernest Baker Houghton.....	<i>Schenectady</i>	Δ Υ House
e	Horace Newton Hubbs.....	<i>Geneva</i>	A Δ Φ House
e	Edward Richard Hughes.....	<i>Schenectady</i>	25 Glenwood Blvd.
s	William Arthur Hughes.....	<i>Schenectady</i>	25 Glenwood Blvd.
c	Charles Hedrick Hummer.....	<i>Ravena</i>	K A Lodge
s	Hazen Hunter	<i>Florida</i>	B Θ Π House
s	Thomas Philip Keating, Jr.....	<i>Schenectady</i>	322 Germania Ave.
s	Isidor Krohn	<i>Utica</i>	723 Nott St.
c	Barlow Lingley Loomis.....	<i>Unadilla</i>	Pyramid Club
ls	Victor Alexander Lord.....	<i>Syracuse</i>	142 Park Place
ls	Roger William Macmillan.....	<i>Schenectady</i>	Φ Γ Δ House
*s	Robert A. MacTaggart.....	<i>Schenectady</i>	Δ Υ House
e	Cornelius Mahaney.....	<i>Fort Plain</i>	Pyramid Club
e	William Hubert Mandeville.....	<i>Elmira</i>	Ψ Υ House
c	Austin Geddes Martin.....	<i>Alba, Pa.</i>	K A Lodge
e	Harry Benjamin Marvin.....	<i>New York City</i>	Δ Υ House
s	Comerford McLoughlin	<i>Rye</i>	K A Lodge
e	Merton Moore	<i>Potsdam</i>	Δ Υ House
e	Edwin Asa Norton.....	<i>Derry, N. H.</i>	821 Strong St.
*e	Francisco de Salles Oliveira....	<i>Sao Paulo, Brazil</i>	N. S. N. C.
*e	Russell Ainslee Orr.....	<i>Summit, N. J.</i>	K A Lodge
e	David Benson Page, Jr.....	<i>Oswego</i>	Σ Φ Place
*s	Henry Z. Persons.....	<i>East Aurora</i>	A Δ Φ House

e	Clarence Eugene Peterson.....	Schenectady.....	220	Liberty St.
e	Charles Howard Purdy.....	Downsville.....	Φ Δ Θ	House
ls	Frank Stanley Randles.....	Argyle.....		Pyramid Club
e	Orlando Ferreira da Rosa.....	Sao Paulo, Brazil.....	M. S. S. C.	
e	Merrill Augustus Sauerbrei.....	Corinth.....		Pyramid Club
e	John L. Scully.....	Schenectady.....	526	Liberty St.
ls	Earl J. Sharp.....	Altamont.....	Φ Δ Θ	House
ls	Frank Leander Smith.....	Morrison, Ill.....	X Ψ	Lodge
s	Stanley Maynard Smith.....	Herkimer.....	Ψ τ	House
ls	Donald Arthur Starbuck.....	Gouverneur.....	B Θ Π	House
e	David George Raymond Stoetzel	Schenectady.....	407	Francis Ave.
e	Hubert Josiah Titus.....	Schenectady.....	1371	Union St.
e	John Edward Turgeon.....	Clayton.....	33	University Place
c	Edward C. Van Deusen.....	Schenectady...	44	Glenwood Blvd.
e	Gordon O. Vosburgh.....	Johnstown.....	Δ Φ	House
e	John Henry Vought, 2nd.....	East Aurora.....	Σ Φ	Place
s	William Winslow Wait.....	Schenectady.....	A Δ Φ	House
e	Gerret Van Wagensen Wood....	Geneva.....	Σ Φ	Place
e	Howard Lee Woods.....	Albion.....	Ψ τ	House

Sophomores—80

Freshmen, Class of 1916

s	Glen Dale Aldrich.....	Bakersfield, Cal..	6	Harrison Ave.
s	Harlan Barrett Allen.....	Lowville.....	5	Gillespie St.
ls	Romeyn Treadwell Allen.....	Tarrytown.....	230	State St.
e	Fred Leslie Anderson.....	Kellogg, Ida.....	1022	State St.
ls	Howard Alfred Arany.....	Schenectady.....	858	Emmett St.
e	Walter Ransom Gale Baker.....	Schenectady.....	108	Park Place
e	Lucius Eugene Baldauf.....	Eden.....	44	Glenwood Blvd.
e	Richard Berger, Jr.....	New York City.....	Σ Φ	Place
s	Albert Vander Veer Blessing....	Albany.....	Φ Γ Δ	House
s	Frank Stanton Bogaskie.....	Johnstown.....	Δ Φ	House
e	Lloyd Athol Bosworth.....	Geneva.....		North Colonnade
ls	Charles Foster Brown.....	Schenectady.....	K A	Lodge
ls	Matthew Brucker	Schenectady.....	31	Catherine St.
e	Meade Cook Brunet.....	Petersburg, Va.....	Σ Φ	Place
s	Leroy Joseph Butler.....	Waterford.....	I	Gillespie St.
s	Thomas Tennien Callahan.....	Gouverneur.....	B Θ Π	House

e	Walter Allen Churchill.....	Oswego.....	Σ Φ Place
s	William Mansfield Clinnick.....	Schenectady.....	218 Lafayette St.
e	Peter J. M. Clute.....	Schenectady.....	801 Strong St.
e	William Stewart Cole.....	Scotia.....	26 Eagle St., Scotia
e	Horace Bernard Compton.....	Scotia.....	4 Lincoln St., Scotia
s	Basil Warner Conrad.....	Hartford.....	Pyramid Club
ls	Kenneth Creble	Feura Bush.....	759 Nott St.
e	Carl Frederick Danner.....	East Aurora.....	B Θ Π House
e	William Wallace Darrow.....	Chatham.....	Δ Υ House
c	Mulford David De Forest.....	Schenectady.....	447 McClellan St.
e	George Edward De Rouville....	Albany.....	Δ Υ House
e	Harry Clifford Dikeman.....	Freeport.....	Ψ Υ House
e	Lloyd Elmer Dunkelberger.....	Lockport.....	5 Avon Road
e	Leslie Franklin Edgerton.....	Hartsdale.....	Σ Φ Place
s	Revington Lyman Embree.....	Stamford, Conn.....	N. S. N. C.
e	James Harold England.....	Albany.....	B Θ Π House
e	Donald Alexander Ennis.....	Scotia...312 Mohawk Ave.,	Scotia
c	Albert Henry Faber, Jr.....	Schenectady.....	Φ Γ Δ House
s	Roy George Fales.....	Buffalo.....	Φ Γ Δ House
e	Nathaniel Augustus Finch, Jr...	Buffalo.....	A Δ Φ House
e	August Flam	Schenectady.....	501 Crane St.
e	John Flam	Schenectady.....	501 Crane St.
c	Lee Chase Fletcher.....	Gillett, Pa.....	711 Nott St.
e	Walter Franck	Schenectady.....	831 Grant Ave.
s	Donald Dickinson Fraser.....	Johnstown.....	Δ Φ House
s	Harold Brooks Gardner.....	Meadowdale.....	X Ψ Lodge
e	Everett Edward Garrison.....	Yonkers.....	A Δ Φ House
e	Hyatt Masten Garrison.....	Yonkers.....	A Δ Φ House
e	Howard Allen Glenn.....	Scotia.....	K A Lodge
e	Clarence Elmer Glindmyer.....	Scotia.....	R. F. D. No. 8, Scotia
c	William Carroll Gunning.....	Freeport.....	Ψ Υ House
s	John Leslie Hagar.....	Gloversville.....	Δ Φ House
s	George Fulford Hanson.....	Schenectady.....	A Δ Φ House
ls	Kenneth Boardman Hanson.....	Amsterdam.....	A Δ Φ House
s	Paul Alfred Hauenstein.....	Buffalo.....	A Δ Φ House
e	Edward Quigley Higgins.....	Waverly.....	123 Park Ave.
e	Arnold Hooper	Albany.....	X Ψ Lodge
s	George Nelson Hopkins.....	Sodus.....	Φ Δ Θ House

e	Albert Ingalls Howd.....	Schenectady.....	22 Bedford Road
s	Eugene J. Hummer.....	Ravena.....	Scotia
e	George Edward Huthsteiner....	Schenectady.....	X Ψ Lodge
ls	John Wagner Jackson.....	Fort Plain.....	Φ Γ Δ House
c	Avrom Myer Jacobs.....	Albany.....	312 Lenox Road
e	Anthony John Janulis.....	Amsterdam....	10 Landon Terrace
s	Carl Burt Jenkins.....	Glens Falls.....	Φ Γ Δ House
s	Herbert John Kauth.....	Buffalo.....	41 N. Wendell Ave.
e	Kenneth Beach Keefer.....	Albany	X Ψ Lodge
e	Daniel Jerome Keleher.....	Port Chester.....	N. S. N. C.
c	Milton De Forest Ketchum....	Wynantskill.....	Φ Γ Δ House
s	Norton Heath Kirkpatrick.....	Geneva.....	Σ Φ Place
e	Harry Russell Kirkup.....	Bay Shore.....	K A Lodge
e	Morris Klein	Schenectady..	339 Schenectady St.
e	James Taylor Landreth.....	Schenectady.....	A Δ Φ House
e	Harold Miller Lewis.....	Geneva.....	M. S. S. C.
e	William Cahill Loughlin.....	Fort Edward.....	Φ Γ Δ House
s	Karl Griffith Lovett.....	Albany.....	Δ T House
s	Cornelius D. Lowell.....	Mt. Clemens, Mich.	A Δ Φ House
e	Philip Tage Mallen.....	Chicago, Ill.....	X Ψ Lodge
e	Alberto Marcal	Larangeiras, Brazil.	P. O. Box 280
e	Henry Floryan Marcinkiewicz...	Schenectady....	218 Seward Place
e	James Mauro	Gloversville.....	14 Barrett St.
e	George Glenn Mercer.....	Schuylers Lake.....	721 State St.
e	Ralph Merton Mixter.....	Warren.....	104 Park Ave.
e	Millard Harold Moulds.....	Selkirk.....	Θ Δ Φ House
e	Thomas Richard Neville.....	Schenectady.....	121 Romeyn St.
e	Raymond Arthur Newton.....	Sidney.....	Δ T House
e	William Pierre Northrop.....	Newburgh.....	Φ Δ Θ House
s	Merlin Leslie Ogsbury.....	Altamont.....	Φ Δ Θ House
e	Edward Grier Peirson.....	Little Britain.....	Δ Φ House
s	Barron Peck Reed.....	New York City.....	N. S. N. C.
ls	Edward William Reich.....	Schenectady.....	Θ Δ Φ House
ls	Julius Louis Reich.....	Schenectady.....	Θ Δ Φ House
e	José de Assis Ribeiro.....	Sao Paulo, Brazil.....	S. S. S. C.
e	Earl Leroy Rice.....	Scranton, Pa.....	X Ψ Lodge
e	William Alfred Robinson.....	Van Etten.....	29 Yates St.
ls	Raymond Howard Rollins.....	Round Lake.....	503 Lenox Road

e	Howard Britton Santee.....	Williamson.....	Φ Δ Θ House
s	Avery Hugo Sarno.....	Amsterdam.....	73 Academy St.
ls	Fred William Sheckelmann.....	Schenectady.....	R. F. D. No. 1
e	Robert Thomas Scully.....	Schenectady.....	526 Liberty St.
c	Erwin George Simmons.....	Hobart.....	135 Van Vranken Ave.
e	Carlton Newell Smith.....	Schenectady.....	B Θ II House
e	Orlando Miller Smith.....	Goshen.....	148½ Van Vranken Ave.
e	Joseph Howard-Soler	New York City.....	X Ψ Lodge
e	José Cuba de Souza.....	Sao Paulo, Brazil...	P. O. Box 79
e	Benjamin Spraragen	Warwick.....	827 Albany St.
e	William Spraragen	Warwick.....	827 Albany St.
c	Milton Hymes Sternfeld.....	Albany.....	312 Lenox Road
e	Glenn Ridgeway Stevens.....	Newark.....	B Θ II House
s	Karl Montgomery Stoller.....	Schenectady.....	X Ψ Lodge
s	Leon Blanchard Streeter.....	Lake George.....	Θ Δ Φ House
s	Guy Joseph Tanzer.....	Amsterdam.....	Pyramid Club
c	James Barker Taylor.....	Greenville.....	301 Seward Place
c	Richard Erastus Taylor.....	Greenville.....	301 Seward Place
e	Charles Van Orden Terwilliger.	Albany.....	125 Avenue B
e	Xenophon D. Theocharides.....	Marsovan, Turkey..	Edison Hotel
e	Leon Edward Turpit.....	Elnora.....	118 Glenwood Blvd.
e	Paul C. Van Deusen.....	Cooperstown.....	Φ Δ Θ House
s	Leland Russell Van Wert.....	Melrose.....	104 Park Ave.
s	Schuyler Vroman	Middleburgh.....	Δ Φ House
e	Edward Clifton Vrooman.....	Schenectady.....	B Θ II House
e	John Raymond Walsh.....	Westfield.....	620 State St.
ls	John Cooper Wiley.....	Buffalo.....	Ψ T House
ls	Benjamin J. Williams.....	Greenville, Texas....	Ψ T House
s	Hugh Jeremiah Williams.....	Elmhurst, Pa....	City Y. M. C. A.
e	Horatio Woolever	Herkimer.....	23 Linden St.
s	Robert Henry Wright.....	Rensselaer.....	Δ T House
e	Walter Elsworth Wynne.....	Albany.....	104 Park Ave.
s	Horace Zimmer.....	Gloversville.....	Δ Φ House

Summary of Students, Union College

Candidates for the Master's Degree.....	20
Graduate Students	5
Seniors.	66
Juniors.	70
Sophomores	80
Freshmen	125
Total.	366

STUDENTS OF THE ALBANY MEDICAL COLLEGE

Fourth Year Class

William A. Ackroyd, B. S.....	East Schodack
Wesley M. Adams.....	Davenport
Morris Byron Beecroft.....	Schaghticoke
Orvis A. Brenenstuhl.....	Petersburg
Darwin A. Bruce.....	Albany
John L. Byrnes.....	Schenectady
Garrett M. Clowe.....	Schenectady
Walter R. L. Coakley.....	Buffalo
Rufus B. Crain.....	Richfield Springs
Nathaniel Crost.....	Saratoga Springs
Burke Diefendorf	Fort Plain
Jacob Drooz	Albany
Dwight G. Dudley.....	Maine
Paul C. Fleri.....	Brooklyn
Hugh V. Foley.....	Watervliet
George V. Genzmer.....	Pittsfield, Mass.
Elmer R. Gladstone.....	Shavertown
Alexander M. Glückstein.....	Brooklyn
Hugh S. Gregory.....	Horseheads
Raymond Hensel	Buffalo
Harry S. Howard.....	Albany
Alson J. Hull.....	Williamstown, Mass.
Eugene F. Hull.....	Berlin
Ray H. Humphrey.....	Rensselaer
William J. Jones.....	Amsterdam
Whitney H. Joyce.....	Unadilla
Joseph Karger	New York City
Arthur Katzenbogen	Brooklyn
William H. Ladue.....	Beekmantown
Roy I. Lippincott.....	Campbell Hall
John W. Mambert.....	Churchtown
Schuyler McCulloch Marton.....	Albany
Raymond F. McAloon.....	Keeseville
Gaetono G. Nicosia.....	Brooklyn
Michael Edward Nolan.....	Eagle Bridge

William O'Connor, B. S.....	New York City
Elmer H. Ormsby.....	South Glens Falls
John S. Parker.....	Oneonta
Robert E. Plunkett.....	Troy
William C. Rausch, Jr.....	Albany
Conrad A. Rissberger.....	Albany
Ernest C. Schultz.....	Schenectady
Jacob Schneider	Brooklyn
Woodard Shaw.....	West Hebron
Axel F. Swanson.....	Southampton, Mass.
John D. Tidaback.....	Bloomfield, N. J.
Harold D. Tobin.....	Chateaugay
Guy B. Van Alstine.....	Canajoharie
Frank J. Williams.....	Utica
Leon Wolff	Brooklyn
Charles W. Woodall.....	Schenectady
David Truman Brewster, Jr., M. D.....	Montrose, Pa.
Fourth Year Class—52.	

Third Year Class

David W. Beard.....	Cobleskill
John P. Byrnes.....	Pittsfield, Mass.
Edward J. Callahan.....	Mechanicville
Daniel F. Carmody.....	Albany
George C. Carter.....	Albany
William H. Casey.....	Troy
John K. Crandall.....	Wappingers Falls
George J. Culver.....	Schenectady
Daniel S. Cunning.....	Troy
Frank E. Deeds.....	Schenectady
Albion J. Fitzgerald.....	Albany
Frank Furlong	Highland
John W. Gard.....	Auburn
Clarence Gardinier	Schenectady
Parker A. Groff	Rome
Robert W. Helm.....	Saratoga Springs
John T. Hogan.....	Troy

William P. Howard.....	Albany
Edwin H. Huntington.....	Hopewell Junction
Charles A. Joy.....	Springwater
Harry Vincent Judge.....	Albany
Wilbur F. MacDonald.....	Schenectady
John S. McCormick, Ph. G.....	Albany
Thomas H. McGrail.....	Albany
Floyd G. Nellis.....	Boonville
Wilber Sylvester Newell.....	Syracuse
Vincent J. T. O'Neill.....	Highland Falls
Julius J. Padula.....	Albany
Harry D. Parkhurst.....	West Winfield
Charles A. Perry.....	Rome
Joseph E. Randolph.....	Belleville
Robert Reid, Jr.....	Schenectady
Harry S. Reynolds, B. S.....	Schenectady
Edward I. Robbins.....	Syracuse
Joseph D. Rosenthal.....	Brooklyn
Frank A. Searle.....	Southampton, Mass.
James I. Schoonmaker.....	West Coxsackie
Lewis J. Smith.....	Westfield, Mass.
Theron Smith	Newburgh
Leo R. Tighe.....	Cohoes
William B. D. Van Auken.....	Voorheesville
William I. Walsh.....	Troy
James J. Walsh, LL. B.....	Amsterdam
John Waluk.....	Amsterdam
Willard E. Wheelock.....	Canajoharie
Cecil C. Whittemore.....	Albany
Fred DeG. Wilson.....	Downsville
Laurence R. Worrell.....	Greene
Harry T. Wygant.....	Watervliet
Third Year Class—48.	

Second Year Class

James MacFeeters Archibold.....	Cohoes
Percy H. Austin.....	Warrensburg

Walter S. Bennett.....	Hartford
John E. Burke.....	Schenectady
John D. Carroll.....	Troy
Hugh S. Chidester.....	Saugerties
Samuel Colliss	New York
Arthur H. Congdom.....	Fort Plain
Albert N. Crouch.....	Troy
Stephen H. Curtis.....	Troy
Gerald E. Dailey.....	Gloversville
Frank E. Dean, Jr.....	South Shaftsbury, Vt.
Irwin Van Olinda Decker.....	Troy
Arthur M. Dickinson.....	Albany
Francis T. Duffy.....	Troy
Loyal L. Dunlop.....	Stony Creek
James M. Dunn.....	Schenectady
Lawrence J. Early.....	Schenectady
Frederick G. Eaton.....	Saratoga Springs
Arthur J. Edson.....	Oneonta
Eugene A. Eicher, A. B.....	Albany
Guy Fish.....	Indian Lake
James W. Fitzgerald.....	Troy
Hector J. Gibeau.....	Cohoes
Leon W. Green.....	East Springfield
William L. Grogan.....	Rome
Ralph M. Hall.....	Rensselaer
Raoul A. Hebert.....	Cohoes
Leon E. Heslin.....	Saratoga Springs
Sarkis K. Keshishian, A. B.....	Schenectady
Stanley M. King.....	Urlton
James S. Lyons.....	Albany
William B. McKeon.....	Troy
James B. McCormick.....	Troy
Martin A. Murphy.....	Hoosick Falls
Joseph W. Miller.....	New York
William F. Nealon.....	Hoosick Falls
James M. Neary.....	Watervliet
Charles L. Nichols.....	Philmont

John J. O'Connor.....	Albany
Jonathan Pearson, B. S.....	Schenectady
Theodore D. Reed.....	Albany
George S. Reitter.....	Stepney Depot, Conn.
Homer I. Rexford.....	Watervliet
Arthur G. Rogers, Jr.....	Rensselaer
William J. Ryan.....	Newport
Ernest R. Schilling.....	East Chatham
Frank P. Schneider.....	Utica
Benjamin H. Shapiro.....	Glens Falls
Byron G. Shults.....	Johnstown
Robert C. Simpson, Jr.....	Amsterdam
William P. Sweeny.....	Saratoga Springs
Charles W. Tomlinson.....	Lansingburg
Leonard Kip Van Dyck, A. B.....	Philmont
Herbert A. Vogel.....	Albany
Fred Vosburgh.....	Cobleskill
Archibald A. Walker.....	Callicoon
John J. Ward.....	Johnstown
Henry R. Washbon.....	Morris
Earl C. Waterbury.....	Campbell Hall
Bernath Weiss.....	Brooklyn

Second Year Class—61.

First Year Class

Theodore J. Angell.....	Chatham
Harold A. Bancroft.....	Schenectady
Morgan O. Barrett.....	Plattsburgh
Raymond G. Bell.....	Suburn
Louis A. Bellegarde.....	Albany
Edward O. Boller.....	Elizabeth, N. J.
Thomas McG. Brennock.....	Albany
William C. Brons.....	Jamaica
James R. Cahill.....	Montgomery
William J. Carroll.....	Sag Harbor
Harold F. Cleveland, Ph. G.....	Salem
Lawrence H. Cotter.....	Poughkeepsie

Howard W. Davis.....	Schenectady
Frederick G. Decker.....	Rensselaer
Walter J. Dillon.....	Watervliet
Richard P. Doody.....	Cohoes
Henry E. Elwood, Jr.....	Corning
Harry G. Evens.....	Luzerne
Patrick J. Fitzgibbons.....	Amsterdam
Glenn D. Frost.....	Van Hornesville
William E. Gazely.....	Albany
Karl Gebhard	Mt. Vernon
Joseph A. Gratton.....	Troy
Clarence W. Hall.....	Luzerne
Chester A. Hane.....	Albany
John L. Hemstead, Ph. G.....	Waterford
Hyman Hershberg.....	Albany
Herbert T. Hewett.....	Minaville
Frederic W. Holcomb.....	Paleville
Truman E. Ives.....	North Troy
Gerald R. Jamieson.....	Saratoga Springs
Howard C. Johnston.....	Horicon
Howard M. Kenyon.....	Albany
John C. Knapp.....	Philmont
Charles A. Krauss.....	Watervliet
Herman Lasher	Kiskatom
Francis J. Lawler.....	Pulaski
Milton L. Lewis.....	Albany
Earl C. MacCordy.....	Amsterdam
Frank T. B. Maguire.....	Albany
Tobias D. Marrazzo.....	New York City
Royal H. Mayhew.....	Whitesboro
Howard L. McDermott.....	Schenectady
John W. McKeever.....	Newburgh
Donald E. McKenna.....	Brooklyn
Walter McShane	Springfield Center
Alexander L. Morey.....	Utica
John L. Mulcahy.....	Cohoes
Edward B. O'Keefe.....	Hadley
Matthew F. Olstein.....	Peekskill

Francis J. O'Neil.....	New York
Robert M. Palmer.....	Gloversville
Orla J. Park.....	Hudson Falls
Harold A. Peck.....	Albany
Ray E. Persons.....	Jewett
Donald D. Prentice.....	Pittsfield, Mass.
Abraham M. Rabinowitz.....	Albany
John J. Randall.....	Troy
George M. Richard.....	Corning
Clarence F. Rinkle.....	Boonville
Leonard W. Ripton.....	Johnstown
Leslie E. Sanford.....	Albany
Leslie B. Seaport.....	Cohoes
Edward G. Sheehan.....	Watervliet
Rudolph J. Shafer.....	Castleton
Vincent G. Smith.....	Central Bridge
Howard B. Swan.....	Chestertown
Harry A. Taylor.....	Hudson
Harry K. Tebbutt, Jr.....	Albany
Wesley A. Van Deusen.....	St. Johnsville
Charles F. Walsh.....	Watervliet
Theodore S. West.....	New York
Raeburn J. Wharton.....	Summit
Earle W. Wilkins.....	West Albany
Ernest C. Williams.....	Adams Center

First Year Class—74.

Summary of Students, Albany Medical College

Fourth Year Students	52
Third Year Students	48
Second Year Students	61
First Year Students	74
Total.	235

STUDENTS OF THE ALBANY LAW SCHOOL

Second Year Class

Samuel E. Aronowitz (Dartmouth).....	Albany
Benjamin Axelroad	Albany
Pedro Baiges	Amasco, P. R.
Aaron S. Bliss.....	Smithfield
Harold E. Blodgett (Union).....	Schenectady
William M. Bray (Union).....	Churubusco
Paul E. Brown.....	Unadilla
LeRoy G. Butler.....	Corinth
William W. Campbell.....	Schenectady
Samuel Caplan	Albany
Horace B. Casey.....	Delmar
Tristram Coffin (Union).....	Hudson
Chas. G. Coffin.....	Catskill
Chas. J. Corbally.....	Poughkeepsie
John F. Delaney.....	Albany
Geo. C. Donahue (Illinois).....	Dalton, Mass.
Peter DeKay Dusinberre.....	Florida
Warren S. Fales.....	Troy
Esther H. Goodstein.....	Albany
Robert G. Groves.....	Kingston
Arthur W. Handly	Watertown
T. Arthur Hendricks.....	Watertown
Leslie E. Hicks.....	Mechanicville
Fred Jeram	Newtonville
Maximilian J. Jasoloski.....	Schenectady
David I. Jersky.....	Troy
Edward Jones	Rutland, Vt.
Bertram P. Kavanaugh.....	Troy
Bernard W. Kearney.....	Schenectady
Judson S. Langdon (Yale).....	Schenectady
Myer J. Lavin.....	Albany
Ralph Levy	Malone
Theodore B. Lull.....	Edmeston
Joseph H. Lumpkin (Georgia).....	Athens, Georgia
Joseph A. McGraw.....	Albany

Charles L. McMahon.....	Schuylerville
Leo D. Mahoney.....	Rochester
Henry J. Mather.....	Whallonsburg
Joseph P. Mulholland.....	Troy
Catherine S. Murphy.....	Hudson
Charles F. Murray (Union).....	Albany
Daniel H. Myers (Yale).....	Albany
James A. Noonan.....	Lockport
Edward J. O'Connell (Union).....	Albany
Joseph P. O'Connell.....	Hawleyton
Thaddeus S. Ogonowski.....	Schenectady
Charles B. Rice.....	Waterford
Peter A. Rogers, Jr.....	Watervliet
Jacob Rubenstein	Rochester
Alfred I. Schimpf.....	Canajoharie
Frank S. Sharp.....	Delmar
Hamlet A. Smyth (Rochester).....	Rochester
Daisy L. Snook.....	Amsterdam
Kathryn H. Starbuck (Vassar).....	Saratoga Springs
James Tracey Taaffe.....	Albany
Eugenio Vera	San German, P. R.
Melvin G. Vernon.....	Florida
Walter Wait	Corinth
Fred L. Webb.....	Salem
C. E. Williams, Jr.....	Verona Mills
W. Chase Young.....	Hudson Falls

Second Year Class—61.

First Year Class

E. Lopez Acosta.....	San German, P. R.
E. Lee Allen.....	Richfield Springs
Leo W. Begley.....	Schenectady
John H. M. Benson.....	Troy
Stephen W. Brennan.....	Clinton
Francis E. Burns.....	Catskill
Lucien E. Clickner (Cornell).....	Troy
Joseph P. Coyle.....	Wellsville

Ambrose V. Cunning.....	Troy
Hugh P. R. Dawson....	Schenevus
William H. DeKay, Jr.....	Hudleyville
Joseph F. X. Devaue (Holy Cross).....	Troy
Arthur C. Downing.....	Mechanicville
Edmund Duffy	Troy
Irma D. Ellis.....	Albany
Holland R. Foster.....	Owego
Maurice Freedman	Albany
James H. Gould.....	Scotia
Warren E. Griffith.....	Albany
Patrick S. Guinnane.....	Jamestown
Charles T. Hurley.....	Seneca Falls
James E. Kelly.....	Troy
Alexander H. Leamon (Union).....	Albany
LeRoy Lounsberry	Kingston
Allan B. Mann (Union)	Schenectady
Arthur D. Mann (Union).....	Schenectady
John B. Marron (Holy Cross).....	Port Henry
Carroll E. Mealey.....	Valatie
William J. Meehan.....	Troy
John J. Moy.....	Hudson
Roy W. Peters (Union).....	Schenectady
Antonio Ponton	Camerio, P. R.
Byron H. Proper.....	Jefferson
Tobias E. Purcell (Cincinnati).....	Albany
Jacob S. Rassin.....	Troy
Roy R. Richard.....	Plattsburg
Ogden J. Ross.....	Troy
Ralph L. Smith.....	Monticello
Walter D. Smith.....	Pulaski
Charles T. Spencer.....	Watervliet
Charles A. Stone, Jr. (Wesleyan).....	Albany
D. Watermann Sweet.....	Amsterdam
John S. Woodward (Union).....	Warrensburg
Fred C. Waterman.....	Troy
John C. Welsh.....	Catskill

Harry F. Whiton.....	Troy
Leslie A. Wiggins.....	Rome
First Year Class—47.	

Summary of Students, Albany Law School

Second Year Class	61
First Year Class.....	47
Total.	108

STUDENTS OF THE ALBANY COLLEGE OF PHARMACY

Senior Class

Clarence C. Abbott.....	Salem
Earl D. Bailie.....	Greenwich
Norman W. Bosworth.....	Troy
Thos. J. Brierton.....	Watervliet
John H. Canfield.....	Hoosick Falls
Michael F. Carroll.....	Troy
Harold C. Clark.....	Saratoga Springs
Frank L. Downes.....	Binghamton
Willard A. Durfee.....	Eaton
Louis G. Firman.....	Oneonta
Henry Gross	Johnstown
Howard J. Hall.....	South Schroon
John J. Healy, Jr.....	Troy
Rena M. Henault.....	Tupper Lake
William B. Howe.....	Binghamton
Harold L. Keeler.....	Norwich
John E. Kelly.....	Albany
Sarkis O. Kerian.....	Troy
Robert T. Kinch.....	Walton
Perry A. Laplant.....	Malone
Charles M. MacGibbon.....	Walton
Sylvester E. McDermott.....	Cohoes
Fred J. McIlreath.....	Amsterdam
Charles A. Mitchell.....	Cooperstown
Frederick J. Mueller.....	Catskill
John J. Murphy.....	Utica
Bernard H. Nelson.....	Waverly
John F. O'Brien.....	Mechanicville
John F. O'Leary.....	Albany
Maynard E. Osborne.....	Hunter
Henry P. Pellerin.....	Cohoes
Leland P. Quinlavin.....	Ilion
Herman P. Rappold.....	Castleton
Sarah Richardson	Cambridge
Russell St. Marie.....	Indian Lake

Minna Sanders	Albany
Clarence E. Schneider.....	Troy
Ralph F. Spaulding.....	Salem
Samuel Sternfeld	Albany
Kenneth W. Unsworth.....	Binghamton
Everett L. Vrooman.....	Middleburg
John W. Wieser.....	Albany
Forrest J. Williams.....	Remsen
Harry O. Withey.....	Cooperstown
Seniors—44.	

Juniors

Roy Abernethy	Madrid
Fred A. Ablett.....	Albany
Chas. L. Archambeault.....	Plattsburgh
Dewitt B. Armstrong.....	Pine Bush
Florence H. Backer.....	Albany
Earl C. Baker.....	Potsdam
Joseph H. Brown.....	Albany
Emanuel Brunt	Johnstown
James A. Byrne.....	Ballston Spa
George E. Conrad.....	Utica
Raymond C. Curtis.....	Saratoga Springs
Vincent P. Daly.....	Albany
Thomas F. Darmody.....	Salem
Raymond D. Darringer.....	Catskill
Abner F. Dechant.....	Norristown, Pa.
Alexander Deiches	Albany
Paul G. Dennis.....	Rensselaer
Warren E. Doll.....	Newburgh
Charles Edwards	Albany
Lester R. Finklestein.....	Albany
Stanley J. Fischer.....	Oneonta
Norman J. Francis.....	Troy
Harry E. Frink.....	Falls Village, Conn.
Paul A. Gallup.....	Stamford
Frank A. Galvin.....	Cohoes

Herman L. Grupe.....	Schenectady
Harry D. Hakes.....	Pitcher
Walter M. Hartman.....	Schenectady
Benjamin A. Hensler.....	Albany
Cornelius J. Hector.....	Saranac Lake
Joseph W. Hunting.....	Albany
Ralph Janceris	Amsterdam
John L. Johnson, Jr.....	Lowville
Herbert Jones	Canajoharie
John E. Kelly.....	Little Falls
Charles H. Koon.....	Auburn
William R. Louckes.....	Dolgeville
John T. Macauley.....	Troy
Rufus A. MacGregor.....	Delhi
George L. Mailloux.....	Watervliet
Edward L. Marriott.....	Rome
Ruth L. Marsh.....	Coxsackie
Oscar A. Martin.....	Schenectady
Frank J. McCaffrey.....	Cohoes
Frank F. McDermot.....	Albany
Augustus T. McKinstry.....	Hudson
Antonio E. Melendez.....	Stgo. de Cuba, Cuba
John E. Molloy.....	Schuylerville
George R. Moore.....	Scotia
Harry D. Naum.....	Nassau
Ernest T. Puderbaugh.....	Schenectady
Walter E. Rehm.....	Whitehall
Herbert E. Reynolds.....	North Chatham
Sayles C. Robinson.....	Troy
Nicholas J. Rogers.....	Falls Village, Conn.
William J. Shea.....	Hoosick Falls
Edward G. Sheehan.....	Albany
Chas. W. Smith.....	Troy
Hugh J. Taggart.....	Troy
Arthur H. Town.....	Bloomington
Andrew Ulrich	Greene
John G. Van Nortwick.....	South Kortright
Harry J. Van Vleck.....	Hudson

John B. Vernoy.....	Albany
Roland Vogel	Schenectady
Marion C. Woodlock.....	Dalton, Mass.
Oliver E. Woodruff.....	Lake Placid
Juniors—67.	

Summary of Students, College of Pharmacy

Seniors.	44
Juniors.	67
Total.	111

SUMMARY OF STUDENTS, UNION UNIVERSITY

Union College	366
Albany Medical College	235
Albany Law School	108
Albany College of Pharmacy	111
Total.	820

INDEX

	PAGE
Absences.....	139, 140
Admission	
Union College	
Academic Courses.....	30-41
Engineering Courses.....	30, III, 125
Medical College.....	171
Law School.....	183
College of Pharmacy	187
Dudley Observatory.....	184
Apparatus and instruments.....	105
Awards at Commencement, June 1912.....	161
Calendar	
University.....	8
Union College.....	20
Medical College.....	171
Law School.....	182
College of Pharmacy.....	187
Certificates.....	30
Chapel.....	139
Civil Engineering.....	88, 96
Collections.....	72, 105
Committees	
of Trustees.....	23
of Faculty.....	26
Conditions.....	140
(See also Standing)	
Courses of Study.....	28
(See also Curriculum)	
Alternate Courses in Engineering.....	96
Change of Course.....	139
Curriculum	
Union College.....	73-82, 126-138
Medical College.....	172-174
Law School.....	183
College of Pharmacy.....	188

	PAGE
Degrees and Honors	
Union College	154
Medical College	179
Law School	183
College of Pharmacy	188
Degrees Conferred in 1912—Union College	158
Departments of Instruction	42
Electrical Engineering	110
Employment	144
Engineering School	83
Examinations	
Entrance (See Admissions)	
General	140, 141
(See also Standing and Conditions)	
Excuses (See Absences)	
Expenses	
Union College	142
Medical College	177
Law School	183
College of Pharmacy	188
Faculty	
University	10
Union College	24
Engineering	85
Medical	166
Law	181
Observatory	185
Pharmacy	186
Fees (See Expenses)	
General Engineering	96
Grades (See Standing)	
Graduation	
Union College	154
Medical College	179
Law School	183
College of Pharmacy	188
Graduate Courses	154, 88, 110, 122, 124
Historical Statements	
University	7

Historical Statement— <i>Continued</i>	PAGE
Union College.....	19
Engineering School.....	83
Medical College.....	164
Law School.....	180
College of Pharmacy.....	186
Honors (See Degrees and Honors)	
Commencement.....	155
Special.....	156
(See also Awards in 1912 and Departments of Study)	
Lectures and Lecture Courses	70, 118
Library	71
Laboratories.....	103, 119, 63, 65, 67
Museum.....	72
Officers	
University.....	9
Union College.....	27
Medical College.....	165
Law School.....	181
College of Pharmacy.....	186
Dudley Observatory.....	185
Physical Education.....	69
Prizes.....	150
Promotion (See Requirements)	
Registration	
For Entrance Examinations.....	30, 40
For Conditions Examinations.....	141
For Non-Resident Work toward post-graduate degrees .	155
For Special Honors.....	156
Regulations (General).....	139-144
Reports.....	139
Requirements	
For Entrance (See Admissions)	
For Promotion (See Standing)	
For Graduation (See Graduation)	
For Graduate Degree (See Graduate Courses)	
Rooms.....	143
Sanitary Engineering.....	109

	PAGE
Scholarships.....	145
Standing, how graded, maintenance of.....	139
Irregular.....	141
Advanced.....	32
Students	
Union College.....	190
Medical College.....	202
Law School.....	209
College of Pharmacy.....	213
Summary for University.....	216
Studies, order of (See Curriculum)	
Subjects of Study	42, 88
(See also Department Curriculum)	
Six-year Engineering Course.....	88, 133
Subjects required for Admission.....	31
Terms and Vacations.....	8
(See also Department Calendars)	
Theses.....	95
Tuition (See Expenses)	
Trustees	
Union College.....	22
Medical College.....	165
Law School.....	181
College of Pharmacy.....	186
Dudley Observatory.....	185



Union College Bulletin

University Catalogue Number
1913-1914

Vol. VII No. 1

November 1913

PUBLISHED QUARTERLY BY UNION COLLEGE

SCHENECTADY, NEW YORK

In November, February, May and August

Admitted to the mail as second-class matter

ANNUAL CATALOGUE
OF
UNION UNIVERSITY



1913-1914

PRESS OF
FRANK H EVORY & Co
ALBANY N Y

A.A.W -

CONTENTS

	PAGE
Union University.....	7
University Calendar.....	8
Officers of the University.....	9
University Faculty.....	10
Union College.....	19
Union College Calendar.....	21
Trustees of Union College.....	22
Officers of the Board of Trustees.....	23
Faculty of Union College.....	24
Standing Committees of the Faculty.....	26
College Officers.....	27
Courses of Study.....	28
Admission.....	30
Methods of Admission.....	30
Required Subjects.....	31
Entrance Examinations.....	40
Departments of Instruction.....	42
Curricula of Academic Courses.....	75
Schedule of Required Academic Studies.....	78
Schedule of Elective Studies.....	80
Engineering School.....	83
Engineering Faculty.....	85
General Description.....	87
General Engineering Department.....	95
Sanitary Engineering Department.....	108

Union College	PAGE
Engineering School— <i>Continued.</i>	
Electrical Engineering Department.....	110
Curricula of Engineering Courses.....	121
Attendance and Standing.....	129
Expenses.....	132
Scholarships.....	135
Prizes.....	141
Degrees and Honors.....	146
Degrees and Awards in 1913.....	15
Albany Medical College.....	156
Albany Law School.....	173
Dudley Observatory.....	177
Albany College of Pharmacy.....	179
Students, Union University.....	183
Summary.....	213
Index.....	215

UNION UNIVERSITY

Union University embraces the following institutions:

UNION COLLEGE, Founded 1795

Academic Department	{ Classical Course Latin Scientific Course Scientific Course
Engineering Department (Founded 1845)	{ General Engineering Course Sanitary Engineering Course Electrical Engineering Course

ALBANY MEDICAL COLLEGE, Founded 1838

ALBANY LAW SCHOOL, Founded 1851

DUDLEY OBSERVATORY, Founded 1852

ALBANY COLLEGE OF PHARMACY, Founded 1881

Union College acquired by its charter, granted in 1795, full university powers, but the creation of graduate institutions at Schenectady was not then found practicable. Schools of law and medicine and also an astronomical observatory have long existed at Albany, only a few miles distant. The arrangement naturally suggested by these circumstances was, that the professional schools and the observatory at Albany should be united with Union College, under the charter and board of trustees of the latter. This was accordingly effected by the incorporation of Union University in 1873. The Albany College of Pharmacy was created by the board of governors on June 21, 1881, and incorporated as a department of the university on August 21 of the same year.

The president of Union College and permanent chancellor of Union University has the oversight of the university, each of the institutions having its resident dean. The dean of Union College acts in the place of the president in the latter's absence and also has charge of matters delegated to him by the president. The university board of governors is composed of permanent trustees of Union College and of representatives of each of the other institutions embraced in Union University.

1913—UNIVERSITY CALENDAR—1914

1913

Fall term of Union College begins.....Monday, September 15
 First semester of Law School begins.....Tuesday, September 23
 Winter term of Medical College begins..Tuesday, September 23
 Winter term of College of Pharmacy begins..Monday, October 6
 Election day — recess.....Tuesday, November 4
 Thanksgiving day — recess.....Thursday, November 27
 Fall term of Union College ends.....Saturday, December 23

Christmas recess in all departments

1914

Sessions resumed.....Monday, January 5
 Day of prayer for colleges.....Thursday, January 22
 First semester of Law School ends.....Friday, January 30
 Second semester of Law School begins.....Monday, February 2
 Washington's birthday (Feb. 22)—recess..Saturday, February 21
 Winter term of Union College ends.....Saturday, March 21
 Spring term of Union College begins.....Monday, March 23
 Easter recess.....Friday-Monday, April 10-13
 Commencement, College of Pharmacy.....Tuesday, April 28
 Commencement, Medical College.....Tuesday, May 26
 Commencement, Law School.....Thursday, June 11
 Commencement week, Union College

Sunday-Wednesday, June 7-10

Entrance examinations, Union College

Thursday-Friday, June 11-12

Fall term of Union College begins.....Monday, September 14
 First semester of Law School begins....Tuesday, September 22
 Winter term of Medical College begins...Tuesday, September 22
 Winter term of College of Pharmacy begins..Monday, October 5
 Election day — recess.....Tuesday, November 2
 Thanksgiving day — recess.....Thursday, November 26
 Fall term of Union College ends.....Wednesday, December 23

For calendars of departments, see Pages 20, 163, 175, 180.

OFFICERS OF THE UNIVERSITY

Chancellor

REV. CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Honorary Chancellor, 1913

REV. L. CLARKE SEELYE, D. D., LL. D.

Board of Governors

President, SIMON W. ROSENDALE, LL. D., Albany

Vice-President, AMASA J. PARKER, LL. D.

Secretary, J. NEWTON FIERO, LL. D., Albany

Union College

SILAS B. BROWNELL, LL. D.....	New York City
EDWARD WINSLOW PAIGE, LL. D.....	New York City
GEORGE ALEXANDER, D. D.....	New York City
WARNER MILLER, LL. D.....	Herkimer
NICHOLAS V. V. FRANCHOT, A. M.....	Olean
EDWIN W. RICE, JR., PH. D., SC. D.....	Schenectady
EDWARD P. WHITE, A. M.....	Buffalo
ALONZO P. STRONG, A. B.	Schenectady
EDGAR S. BARNEY, SC. D.....	New York City
FRANKLIN H. GIDDINGS, LL. D.....	New York City

Albany Medical College

SIMON W. ROSENDALE, LL. D.....	Albany
ALDEN CHESTER	Albany

Albany Law School

AMASA J. PARKER, LL. D.....	Albany
J. NEWTON FIERO, LL. D.....	Albany

Dudley Observatory

SAMUEL B. WARD, M. D., PH. D.....	Albany
BENJAMIN WALWORTH ARNOLD.....	Albany

Albany College of Pharmacy

WILLIS G. TUCKER, M. D., PH. D.....	Albany
CHARLES NEWMAN	Albany

UNIVERSITY FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean of Union College and Professor of History and Government

SAMUEL B. WARD, M. D., PH. D.
Dean of the Medical College and Professor of Theory and
Practice of Medicine

J. NEWTON FIERO, LL. D.
Dean of the Law School and Lecturer on Procedure, Equity,
Torts, Evidence and Wills

*LEWIS BOSS, A. M., LL. D.
Director of the Dudley Observatory

BENJAMIN BOSS, A. B.
Acting Director of Dudley Observatory

WILLIS G. TUCKER, M. D., PH. D.
Dean of the College of Pharmacy, Registrar of the Medical
College, and Professor of Chemistry and Toxicology

ALBERT VANDER VEER, M. D., PH. D., LL. D.
Professor of Surgery

†JOHN M. BIGELOW, M. D., PH. D.
Professor Emeritus of Materia Medica, Therapeutics and
Diseases of the Throat and Nose

JAMES P. BOYD, M. D.
Professor of Obstetrics and Diseases of Children

CYRUS S. MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC C. CURTIS, M. D.
Professor of Dermatology

ALFRED B. HUESTED, M. D., PH. G.
Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.
Professor Emeritus of Pharmacy

* Died October 5, 1912

† Died August 25, 1913

HENRY HUN, M. D.

Professor of Diseases of the Nervous System

SAMUEL R. MORROW, M. D.

Professor of the Practice of Surgery and of Orthopedic Surgery

FRANK S. HOFFMAN, A. M., PH. D.

Ichabod Spencer Professor of Philosophy

OLIN H. LANDRETH, A. M., C. E., Sc. D.

Professor of Civil Engineering

HERMAN C. GORDINIER, M. D.

Professor of Physiology

JAMES H. STOLLER, A. M., PH. D.

Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.

Professor of the English Language and Literature

LEWIS R. PARKER

Professor of the Law of Bailments, Bills and Notes, Guarantee
and Suretyship, and Constitutional Law

HOWARD VAN RENSSELAER, M. D.

Professor of Materia Medica and Therapeutics, and Adjunct
Professor of Theory and Practice of Medicine

JOSEPH D. CRAIG, M. D.

Professor of Anatomy, and Curator of the Museum

FLETCHER W. BATTERSHALL

Professor of the Law of Persons and Property, Domestic Rela-
tions, and Partnership

CHARLES P. STEINMETZ, A. M., PH. D.

Professor of Electro-Physics

JOHN I. BENNETT, A. B.

Professor of the Greek Language and Literature

HOWARD OPDYKE, A. B.

Professor of Physics

EDWARD ELLERY, A. M., PH. D., Sc. D.

Professor of Chemistry

FRANK WHITE

Professor of the Law of Corporations

GEORGE LAWYER

Professor of the Law of Contracts, Personal Property and Sales,
and Bankruptcy

FRANK B. GILBERT

Professor of the Law of Real Property and of Statutes and
Statutory Construction

FRANK C. BARNES, A. M., PH. D.

Professor of Modern Languages

HORACE G. McKEAN, A. M.

Professor of Rhetoric and Public Speaking

ANDREW MacFARLANE, M. D.

Professor of Physical Diagnosis and of Medical Jurisprudence

ARTHUR G. ROOT, M. D.

Professor of Diseases of the Throat and Nose

LEO H. NEUMAN, M. D.

Professor of Gastro-Enteric Diseases, and Clinical Professor of
the Theory and Practice of Medicine

JACOB C. E. SCOTT

Professor of Criminal Law

STEWART A. McCOMBER, A. M., M. D.

Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.

Professor of Mathematics

GEORGE D. KELLOGG, PH. D.

Professor of the Latin Language and Literature

ARTHUR W. ELTING, M. D.

Professor of the Practice of Surgery and of Clinical Surgery

EDGAR A. VANDER VEER, M. D.

Professor of Abdominal and Clinical Surgery

JOHN A. SAMPSON, M. D.

Professor of Gynecology

FREDERICK W. CAMERON

Professor of the Law of Patents, Copyright, and Trade Marks

CHARLES J. HERRICK

Professor of Civil Law, International Law, and Conflict of Laws

HARRY S. BERNSTEIN, M. D.
Professor of Pathology and Bacteriology

ERNST J. BERG, M. E., Sc. D.
Professor of Electrical Engineering

HON. D. CADY HERRICK, LL. D.
Professor of the Law of Municipal Corporations

HON. IRVING G. VANN, LL. D.
Lecturer on the Law of Insurance

HON. ALDEN CHESTER
Lecturer on the Federal Judicial System

HON. WILLIAM P. RUDD
Lecturer on the Law of Medical Jurisprudence

FREDERICK D. COLSON
Lecturer on Books and Their Uses

JOHN L. MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

SPENCER L. DAWES, M. D.
Adjunct Professor of Materia Medica, and Director of
Microscopical Laboratory

LA SALLE ARCHAMBAULT, M. D.
Adjunct Professor of Neurology

ROBERT W. KEETON, M. S.
Adjunct Professor of Physiological Chemistry and Experimental
Physiology

GARRET VANDER VEER DILLENBACK, PH. G.
Associate Professor of Pharmacy

WILLIAM A. LARKIN, Ph. G.
Adjunct Professor of Chemistry and Physics

HERMAN BENDELL, M. D.
Clinical Professor of Otology

JESSE M. MOSHER, M. D.
Clinical Professor of Insanity, Neurology, and Electro-
Therapeutics

ROBERT T. HILL, Ph. D.
Assistant Professor of Economics and Sociology

HARRY J. LIPES, M. D.
Clinical Professor of Obstetrics

ARTHUR SAUTTER, M. D.
Clinical Professor of Dermatology and Venereal Diseases

GEORGE E. LOCHNER, M. D.
Clinical Professor of Obstetrics

CLEMENT F. THEISEN, M. D.
Clinical Professor of Diseases of the Throat and Nose

HENRY L. K. SHAW, M. D.
Clinical Professor of Diseases of Children

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON C. STEWART, PH. D.
Assistant Professor of German

STANLEY P. CHASE, PH. D.
Assistant Professor of English

WALTER L. UPSON, E. E., M. S., M. E. E.
Assistant Professor of Electrical Engineering

WARREN C. TAYLOR, S. B.
Assistant Professor of Civil Engineering

ARTHUR J. ROY, C. E., A. M.
Assistant in Dudley Observatory

WILLIAM O. STILLMAN, M. D.
Lecturer on the History of Medicine

CHARLES H. MOORE, M. D.
Lecturer on Ophthalmology and Otology

WILLIAM B. VARNUM, A. B.
Assistant in Dudley Observatory

JAMES F. ROONEY, M. D.
Lecturer on Hygiene and Instructor in Medicine

HOWARD E. LOMAX, M. D.
Lecurer and Demonstrator of Anatomy

GEORGE G. LEMPE, M. D.

Lecturer on Minor Surgery

JAMES N. VANDER VEER, M. D.

Lecturer on Surgical Technic and Instructor in Genito-
Urinary Surgery

ARTHUR J. BEDELL, M. D.

Lecturer on Ophthalmology

JAMES W. WILTSE, M. D.

Lecturer on Dermatology and Genito-Urinary Diseases

JOHN H. GUTMANN, M. D.

Lecturer on Surgery and Clinical Anaesthesia

JOSEPH L. DONHAUSER

Lecturer on Surgical Diagnosis

ALVAH H. TRAVER, M. D.

Lecturer on Clinical Surgery and Instructor in Surgery

CLINTON B. HAWN, M. D.

Lecturer on Clinical Microscopy

CLINTON P. McCORD, M. D.

Lecturer on School Hygiene

JOHN McW. BERRY, M. D.

Lecturer on Radiography

WARREN L. BRADT, PH. G.

Lecturer on Pharmaceutical Jurisprudence

WARDNER D. AYER, M. D.

Lecturer on Histology and Pathology

RALPH E. MYERS

Lecturer on Experimental Pharmacology and Physiological
Chemistry

WALTER C. FOX, M. D.

Lecturer on Histology, Pathological Anatomy, and Bacteriology

CLARENCE E. MULLENS, M. D.

Lecturer on Anatomy

EDGAR R. STILLMAN, M. D.

Instructor in Physiology

EDWIN C. HUTMAN, PH. G.
Director of Pharmaceutical Laboratory

CHARLES K. WINNE, JR., M. D.
Instructor in Theory and Practice of Medicine

JOSEPH A. LANAHAN, M. D.
Instructor in Dermatology and Venereal Diseases

HARRY RAYMOND, A. B.
Assistant in Dudley Observatory

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

GEORGE E. BEILBY, M. D.
Instructor in Surgical Pathology

BRANSON K. DE VOE, M. D.
Instructor in Anatomy

EUGENE E. HINMAN, M. D.
Instructor in Diseases of the Throat and Nose

MALCOLM DOUGLAS, M. D.
Instructor in Physical Diagnosis and Therapeutics

ERASTUS CORNING, M. D.
Instructor in Theory and Practice of Medicine and Physical
Diagnosis

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

LEROY S. BLATNER, D. D. S.
Instructor in Oral Pathology

WILLIAM KIRK, M. D.
Instructor in the Anatomy and Physiology of the Nervous System

JEROME MEYERS, M. B.
Instructor in Physical Diagnosis and Gastro-Enteric Diseases

JARED W. SCUDDER, A. M.
Instructor in Latin

MEADE L. ZIMMER, A. M.
Assistant in Dudley Observatory

RICHARD A. LAWRENCE, M. D.
Instructor in Obstetrics

THEOBALD F. DOESCHER, M. D.
Instructor in Gastro-Enteric Diseases

NELSON K. FROMM, M. D.
Instructor in Materia Medica and Physical Diagnosis

TIFFANY LAWYER, M. D.
Instructor in Gynecology

EDWIN L. DRAPER, M. D.
Instructor in Surgery and Surgical Pathology

WILLIAM G. KEENS, M. D.
Instructor in Diseases of Throat and Nose

WILLIAM W. GIBSON, PH. D.
Instructor in Commercial Pharmacy

HARRY H. DRAKE, M. D.
Instructor in Anatomy and Clinical Assistant

JOSEPH A. COX, M. D.
Instructor in Obstetrics

JOSEPH L. BENDELL, M. D.
Instructor in Surgery

CHARLES G. ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

ALBERT J. SALATHE
Instructor in Chemistry

ARTHUR L. MAXON
Instructor in Greek and Mathematics

CHARLES N. WALDRON
Instructor in American History

LA VERNE A. BOUTON, M. D.
Instructor in Anatomy

FREDERIC C. CONWAY, M. D.
Instructor in Physical Diagnosis

JOHN F. SOUTHWELL, M. D.
Instructor in Surgery

PAUL T. HARPER, M. D.
Instructor in Obstetrics

HARRY E. ROBIE, PH. G.
Instructor in Pharmacy and Mathematics

HARRY W. BAKER, PH. G.
Instructor in Pharmacy and Chemistry

GEORGE E. WISEWELL, M. A.
Instructor in French

EVERETT S. LEE, B. S.
Instructor in Electrical Engineering

HARRY W. BAKER, PH. G.
Instructor in Pharmacy and Chemistry

MAUSER T. STONE, PH. G.
Instructor in Pharmacy and Mathematics

LEROY G. MATTHEWS, PH. G.
Instructor in Physics

RICHARD B. GRAY, M. D.
Assistant in Microscopical Laboratory

LEROY JENKINS, A. B.
Assistant in Dudley Observatory

LEROY Z. MEARNS, C. E.
Assistant in Dudley Observatory

WILLIAM HUNT
Assistant in Dudley Observatory

THOMAS W. JENKINS, M. D.
Assistant Instructor in Histology

CHARLES W. L. HACKER, M. D.
Assistant Instructor in Histology and Pathology

ARTHUR H. STEIN, M. D.
Assistant Instructor in Pathology and Bacteriology

DAVIS BAKER, M. D.
Assistant Instructor in Histology

CHARLES F. MYERS, M. D.
Assistant Instructor in Physiological Chemistry and
Experimental Physiology

RICHARD B. GRAY, M. D.
Assistant in Microscopical Laboratory

UNION COLLEGE

Union College was incorporated by the Regents of the University of the State of New York on the 25th day of February, 1795. It was the second college incorporated in the state, and the first north of the city of New York and west of the Hudson river. It received its name from the circumstance that several religious denominations co-operated in its organization, and it was the first college in the United States which was not of a strictly denominational character. It has continued from its foundation to be a representative institution of Christian unity.

The first president of Union College was the Rev. John Blair Smith, of Philadelphia. He was elected in 1795, and resigned in 1799, only a few months before his death. He was succeeded by Jonathan Edwards, the younger, who died in 1801. The Rev. Jonathan Maxcy, previously president of Brown University, succeeded Dr. Edwards, resigning at the end of two years. In 1804 the Rev. Eliphalet Nott was elected president of Union College, which office he held until his death, on the 29th day of January, 1866. The Rev. Laurens P. Hickok, a graduate of the college, who had long acted as vice-president, was elected his successor. He resigned in 1868. The Rev. Charles A. Aiken succeeded Dr. Hickok in 1869, and resigned in 1871. The Rev. Eliphalet Nott Potter was elected president in 1871, and was inaugurated June 20, 1872. On his resignation, in 1884, the Hon. Judson S. Landon was appointed president *ad interim*, and served until the inauguration of Harrison E. Webster, who was elected president May 23, 1888, and inaugurated June 26, 1888. On his resignation, in January, 1894, Rev. Andrew V. V. Raymond was elected president, and was inaugurated in June, 1894. Dr. Raymond resigned July 18, 1907, and the Rev. George Alexander was appointed president *ad interim*. On January 28, 1909, Rev. Charles Alexander Richmond was elected president. Dr. Richmond was inaugurated June 7, 1909.

1913

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
Sept.	..	1	2	3	4	5	6	Nov.	..	3	4	5	6	7	8
	7	8	9	10	11	12	13		2	10	11	12	13	14	15
	14	15	16	17	18	19	20		9	17	18	19	20	21	22
	21	22	23	24	25	26	27		16	24	25	26	27	28	29
Oct.	..	..	..	..	..	..	..	Dec.	..	1	2	3	4	5	6
	..	..	..	..	..	..	..		30	8	9	10	11	12	13
	5	6	7	8	9	10	11		7	15	16	17	18	19	20
	12	13	14	15	16	17	18		14	22	23	24	25	26	27
	19	20	21	22	23	24	25		28	29	30	31	..	..	..
	26	27	28	29	30	31	..		..	..	..	..	..	..	..

1914

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
Jan.	..	..	..	..	1	2	3	July	..	..	..	..	..	..	..
	4	5	6	7	8	9	10		..	..	..	1	2	3	4
	11	12	13	14	15	16	17		5	6	7	8	9	10	11
	18	19	20	21	22	23	24		12	13	14	15	16	17	18
Feb.	25	26	27	28	29	30	31	Aug.	19	20	21	22	23	24	25
	..	..	..	..	..	..	..		26	27	28	29	30	31	..
	1	2	3	4	5	6	7		..	..	..	..	..	..	..
	8	9	10	11	12	13	14		..	..	..	..	..	..	..
Mar.	15	16	17	18	19	20	21	Sept.	2	3	4	5	6	7	8
	22	23	24	25	26	27	28		9	10	11	12	13	14	15
	..	..	..	..	..	..	..		16	17	18	19	20	21	22
	..	..	..	..	..	..	..		23	24	25	26	27	28	29
Apr.	..	..	..	..	..	..	..	Oct.	30	31	..	..	..	..	..
	1	2	3	4	5	6	7		..	..	..	..	..	..	..
	8	9	10	11	12	13	14		..	..	1	2	3	4	5
	15	16	17	18	19	20	21		6	7	8	9	10	11	12
May	22	23	24	25	26	27	28	Nov.	13	14	15	16	17	18	19
	29	30	31	..	..	..	..		20	21	22	23	24	25	26
	..	..	..	..	..	..	..		27	28	29	30	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
June	5	6	7	8	9	10	11	Dec.	..	5	6	7	8	9	10
	12	13	14	15	16	17	18		4	12	13	14	15	16	17
	19	20	21	22	23	24	25		11	19	20	21	22	23	24
	26	27	28	29	30	..	..		18	26	27	28	29	30	31
	..	..	..	..	..	1	2		25	..	..	..	..	..	..
	..	..	..	..	..	..	..		..	..	..	..	..	..	..
	3	4	5	6	7	8	9		..	..	..	..	..	..	..
	10	11	12	13	14	15	16		1	2	3	4	5	6	7
	17	18	19	20	21	22	23		8	9	10	11	12	13	14
	24	25	26	27	28	29	30		15	16	17	18	19	20	21
	31	..	..	..	..	..	..		22	23	24	25	26	27	28
	..	..	..	..	..	..	..		29	30	..	..	..	..	..
	..	1	2	3	4	5	6		..	..	..	..	..	..	..
	7	8	9	10	11	12	13		..	..	1	2	3	4	5
	14	15	16	17	18	19	20		6	7	8	9	10	11	12
	21	22	23	24	25	26	27		13	14	15	16	17	18	19
	28	29	30	..	..	..	..		20	21	22	23	24	25	26
									27	28	29	30	31	..	..

Figures in heavy type indicate days on which Union College is in session

UNION COLLEGE CALENDAR

1913

Conditions examinations.....Saturday, September 13
 Registration day for freshmen.....Monday, September 15
 Entrance examinations....Tuesday-Wednesday, September 16-17
 Registration.....Tuesday-Wednesday, September 16-17
 First chapel exercises and recitations....Thursday, September 18
 Senior reception to entering students.....Friday, September 19
 Election day — recess.....Tuesday, November 3
 Thanksgiving day — recess, three days..Thursday, November 27
 Allison-Foote prize debate.....Friday, December 5
 Conditions examinations. Friday-Saturday, December 5-6
 Fall term ends.....Saturday, December 23

1914

Registration day for students, winter term..Thursday, January 5
 Recitations begin.....Friday, January 6
 Day of prayer for colleges.....Thursday, January 22
 Washington's birthday (Feb. 22)—recess..Saturday, February 21
 Conditions examinations.....Friday-Saturday, March 6-7
 Winter term ends.....Saturday, March 21
 Easter recess.....Friday-Monday, April 10-13
 Registration day for students, spring term...Monday, March 23
 Recitations begin.....Tuesday, March 24
 Selection of junior and sophomore orator..Wednesday, April 15
 Conditions examinations.....Friday-Saturday, May 1-2
 Presentation of prize essays.....Friday, May 15
 Senior examinations end.....Saturday, May 23
 Memorial day.....Saturday, May 30
 Spring term examinations end.....Saturday, June 6
 Baccalaureate sermon.....Sunday, June 7
 Prize oratory of juniors and sophomores.....Monday, June 8
 Meeting of trustees, societies, alumni.....Tuesday, June 9
 President's reception.....Tuesday, June 9
 Commencement, second Wednesday in June..Wednesday, June 10
 Entrance examinations.....Thursday-Friday, June 11-12
 Conditions examinations.....Saturday, September 12
Fall term, 1914-1915, begins.....Monday, September 14

TRUSTEES OF UNION COLLEGE

Ex-Officio. { HIS EXCELLENCY MARTIN H. GLYNN, Governor
 HON. ROBERT F. WAGNER, Lieutenant-Governor
 HON. MITCHELL MAY, Secretary of State
 HON. WILLIAM SOHMER, Comptroller
 HON. JOHN J. KENNEDY, Treasurer
 HON. THOMAS J. CARMODY, Attorney-General

SILAS B. BROWNELL, LL. D., 71 Wall street, New York

HON. EDWARD W. PAIGE, LL. D., 46 Cedar street, New York

REV. GEORGE ALEXANDER, D.D., 47 University place, New York

HON. WARNER MILLER, LL. D., Herkimer

HON. NICHOLAS V. V. FRANCHOT, A. M., Olean

EDWIN W. RICE, JR., PH. D., Sc. D., Schenectady

EDWARD P. WHITE, A. M., 921 Marine Bank Bldg., Buffalo

EDGAR S. BARNEY, Sc. D., 36 Stuyvesant street, New York

PROF. FRANKLIN H. GIDDINGS, LL. D., Columbia University, New York.

HON. ALONZO P. STRONG, A. B., Schenectady

COURTLAND V. ANABLE, A. B., 31 Nassau street, New York

WILLIS T. HANSON, Schenectady

FRANK BAILEY, ART. D., 175 Remsen street, Brooklyn

WILLIAM PLATT ADAMS, A. B., Red Hook, term of office
 expiring June, 1914

CHARLES B. McMURRAY, A. M., Troy, term of office expiring
 June, 1915

G. HARWOOD DUDLEY, A. B., Johnstown, term of office
 expiring June, 1916

FREDERICK W. CAMERON, A. M., Albany, term of office
 expiring June, 1917

Chairman of the Board

SILAS B. BROWNELL, LL. D.

Treasurer

FRANK BAILEY, ART. D.

Secretary

EDGAR S. BARNEY, SC. D.

Finance Committee

NICHOLAS V. V. FRANCHOT, A. M.

COURTLAND V. ANABLE, A. B.

FRANK BAILEY, ART. D.

SILAS B. BROWNELL, LL. D.

WILLIS T. HANSON

EDWIN W. RICE, JR., PH. D., SC. D.

HON. ALONZO P. STRONG, A. B.

Education Committee

REV. GEORGE ALEXANDER, D. D.

COURTLAND V. ANABLE, A. B.

FRANK BAILEY, ART. D.

EDGAR S. BARNEY, SC. D.

PROF. FRANKLIN H. GIDDINGS, LL. D.

HON. EDWARD W. PAIGE, LL. D.

Committee on Grounds and Buildings

CHARLES B. McMURRAY, A. M.

WILLIAM P. ADAMS, A. B.

FREDERICK W. CAMERON, A. M.

G. HARWOOD DUDLEY, A. B.

WILLIS T. HANSON

EDWIN W. RICE, JR., PH. D., SC. D.

Committee of Resident Trustees

WILLIS T. HANSON

HON. EDWARD W. PAIGE, LL. D.

EDWIN W. RICE, JR., PH. D., SC. D.

HON. ALONZO P. STRONG, A. B.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean

Professor of History and Government

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

OLIN H. LANDRETH, A. M., C. E., Sc. D.
Professor of Civil Engineering

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electro-Physics

JOHN I. BENNETT, A. B.
Professor of the Greek Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D., Sc. D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Secretary
Professor of Modern Languages

HORACE GRANT McKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.
Professor of Mathematics

GEORGE DWIGHT KELLOGG, PH. D.
Professor of the Latin Language and Literature

ERNST JULIUS BERG, M. E., Sc. D.
Professor of Electrical Engineering

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON COLLINS STEWART, Ph. D.
Assistant Professor of German

STANLEY PERKINS CHASE, Ph. D.
Assistant Professor of English

WALTER LYMAN UPSON, E. E., M. S., M. E. E.
Assistant Professor of Electrical Engineering

ROBERT TUDOR HILL, Ph. D.
Assistant Professor of Economics and Sociology

WARREN C. TAYLOR, S. B.
Assistant Professor of Civil Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

CHARLES B. ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

ALBERT JACOB SALATHE, A. M.
Instructor in Chemistry

ARTHUR L. MAXON, A. B.
Instructor in Greek and Mathematics

CHARLES N. WALDRON, B. S.
Instructor in American History

GEORGE ELLAS WISEWELL, M. A.
Instructor in French

EVERETT S. LEE, B. S.
Instructor in Electrical Engineering

Ichabod Spencer Lecturer on Psychology

JOHN DEWEY, PH. D., LL.D.

Librarian

DEWITT CLINTON

Standing Committees of the Faculty

EDUCATION — Professors Ripton, Hoffman, Landreth, Stoller, Hale, Bennett, Opdyke, Ellery, Barnes, March, McKean, McComber, Garis, Kellogg, Berg, Hill, Garrison, Upson.

ADMISSIONS — Professors Barnes, Ripton, Garis, Landreth, Hale, Bennett, Opdyke, March, Kellogg, Berg, Garrison

STAGE APPOINTMENTS — Professors McKean, Ellery, March, Lyon, Chase.

LIBRARY — Professors Hale, Landreth, Bennett, Berg and the Librarian.

SCHOLARSHIPS — Professors Ripton, Bennett, Ellery

DISCIPLINE — Professors Ripton, Landreth, Hale, Bennett, Opdyke, March

STUDENT ACTIVITIES — Professors Opdyke, Bennett, McComber, McKean, Hale

SCHEDULE — Professors Garis and Taylor, Mr. King

ABSENCES — Mr. King, Professors Ellery and March

CATALOGUE — Professors Barnes, Opdyke, Garis

CONVENTIONS — Professors March, Landreth, Upson

PREPARATORY SCHOOLS — Professors Barnes, Ellery, Garis, Kellogg, Mr. King

SENIOR CLASS — Professors March, Kellogg, McKean

JUNIOR CLASS — Mr. King, Professors Chase and Hill

SOPHOMORE CLASS — Professors Stewart and Lyon, Mr. Salathe

FRESHMAN CLASS — Professors Garis, McComber, Taylor

COLLEGE OFFICERS

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

President

President's Rooms, South Colonnade

Consultation hour 12-1 daily

BENJAMIN H. RIPTON, PH. D., LL. D.

Dean

College Office

Office Hours 2:30-4 P. M.*

FRANK BAILEY, ART. D.

Treasurer

175 Remsen St., Brooklyn

HARTLEY F. DEWEY

Assistant Treasurer

College Office

Office Hours 8 A. M.-5 P. M.*

FRANK COE BARNES, PH. D.

Secretary

Room 1, Washburn Hall

Office Hours 3-5 P. M.*

JAMES H. STOLLER, PH. D.

Curator of the Museum

DEWITT CLINTON

Librarian

Library Hours 8 A. M.-1 P. M., 2-6 P. M.*, 7:30-9 P. M.

ESTHER G. ELY, Recorder, and Secretary to the Dean

JANE TUPER, Clerk to the Secretary

ANNE O'N. BEATTIE, Secretary to the President

IRENE T. HIBBARD, Cataloguer in Library

*Except Saturday P. M.

COURSES OF STUDY

1. Courses leading to the Degree of A. B.

Classical Course A. Greek, as indicated on page 35, is required for admission to this course. Latin and Greek are required for two years, and are elective for the remainder of the course. Modern languages are elective in the junior and senior years.

Classical Course B. At the end of the sophomore year students in the Ph. B. course may, if proficient in Latin, elect to be candidates for the A. B. degree. They must then take up the study of Greek and continue it for five hours weekly during the junior and senior years.

2. Course leading to the Degree of Ph. B.

Latin-Scientific Course. This course offers Latin without Greek, for which is substituted additional work in modern languages and science. In the last two years of the course all studies are elective.

3. Course leading to the Degree of B. S.

Scientific Course. This course is based upon the study of mathematics and the sciences, with extended work in English and other modern languages. In the last two years of the course all studies are elective.

In courses 1, 2 and 3 the work of the last two years is elective.

4. One Year Pre-Medical Course

This course is offered to meet the requirements for admission to the Medical Department of Union University in accordance with the recommendations of the American Medical Association.

5. Courses leading to the Degree of B. E.

General Engineering Course. This course offers the foundation of a broad engineering education, comprising mathematics, the sciences, the fundamental principles of the special branches of the profession, some training in history and economics, a knowl-

edge of both French and German and a course in English. During the third and fourth years two alternative options are offered.

Option A. In this division the fundamental principles of advanced technical subjects receive emphasis.

Option B. In this division studies are offered which lead to a training for engineering positions of an executive or administrative nature.

Sanitary Engineering Course. This differs from the general engineering course by substituting special work in sanitary engineering for some of the general engineering studies of the junior and senior years.

Electrical Engineering Course. This course is intended to give a broad and thorough engineering education, with the specific instruction requisite for electrical engineering. During the first two years of the course the work is the same as in the general engineering department; during the junior and senior years the two courses are wholly distinct.

6. Courses leading to Graduate Degrees

Course leading to degree of M. C. E. This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the general or the sanitary engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of M. S. in E. E. This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the electrical engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of Ph. D. This course of two years' graduate study requires for admission the degree of M. E. E. or an equivalent. For details of the work see page 119.

Students in full standing at the end of junior year who have the profession of medicine in view are permitted to take the first year studies of the Albany Medical College as a substitute for the studies of the senior year in Union College. This enables medical students to lessen the time of their academic and professional studies by one year.

REQUIREMENTS FOR ADMISSION

Application and Registration

Blank forms of application to be filled out and forwarded in advance will be furnished by the secretary on request.

Candidates must be at least sixteen years old, and as a preliminary to registration, whether for examination or for enrollment, must present themselves at the office of the secretary on the date named in the calendar published in the college catalogue for the current year, and submit satisfactory testimonials of character.

Methods of satisfying the Requirements

By Examination. The regular entrance examinations are held on the Thursday and Friday immediately following Commencement, and on the Tuesday and Wednesday of the first week of the fall term. The schedule of examinations is given on pages 40-41. Candidates for examination in any subject are expected to present a recommendation from their school principal.

By C. E. E. B. Certificate. Candidates may take the uniform entrance examinations offered by the College Entrance Examination Board. The examinations of the board are held in June of each year, and a list of the places at which they are to be held is published by the board about March 1st. Applications to attend the board's examinations must be addressed to the *Secretary of the College Entrance Examination Board, P. O. Sub-Station 84, New York, N. Y.*, and must be made upon a blank form to be obtained from the secretary of the board upon application. The certificates of this board will be accepted for all subjects passed at a satisfactory grade.

By Regents Diploma. The academic and college entrance diplomas issued by the New York State Education Department will be accepted so far as they cover the requirements for admission to the course desired.

By School Certificate. Certificates from schools approved by the faculty will be accepted for graduates of the school if they

cover the requirements for admission to the course desired and contain a recommendation from the principal of the school that the candidate be admitted to college. Blank certificates, to be filled out by principals of schools, will be furnished upon application to the *Secretary of the Faculty, Union College, Schenectady, N. Y.*

So far as possible all credentials should be forwarded by July 10 of the year in which the candidate desires to enter, and it is expected that all certificates will be submitted not later than September 1st.

Students who enter the freshman class by certificate and fail to maintain their class standing are required to pass entrance examinations in the departments in which they have failed, if they apply for readmission.

Subjects Required for Admission to Each Course

Candidates for admission to the freshman class in any course must meet the requirements specified for that course. The subjects are numbered as in the general list given on pages 32-40.

The term *unit* is used in this catalogue in the sense established by the Carnegie Foundation and the College Entrance Examination Board, and means a course of 4 or 5 periods weekly throughout an academic year of the preparatory school.

A.B. Course, A. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
2. Greek: a, b	See Page 35.....	2 units
3. Latin: a, b, c, d.....	See Page 35.....	4 units
5. Mathematics: a, b.....	See Page 37.....	2½ units
8. Electives.....	See Page 39.....	2½ units
Total		14 units

Ph.B. Course and A.B. Course B. For admission to these courses the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
3. Latin: a, b, c, d.....	See Page 35.....	4 units
4. Modern Languages: a or b...	See Page 36.....	2 units
5. Mathematics: a, b.....	See Page 37.....	2½ units
7. History: a, b, c.....	See Page 39.....	2 units
8. Electives	See Page 39.....	½ unit
Total		14 units

B.S. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
*4. Modern Languages: a or b..	See Page 36.....	2 units
5. Mathematics: a, b, c.....	See Page 37.....	3 units
6. Science.....	See Page 38.....	1½ units
7. History: c.....	See Page 39.....	1 unit
8. Electives.....	See Page 39.....	3½ units

Total 14 units

* Latin a-d, page 35 may be substituted for the requirement in modern languages.

B.E. Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
4. Modern Languages: a or b..	See Page 36.....	2 units
5. Mathematics: a, b, c.....	See Page 37.....	3 units
6. Science.....	See Page 38.....	1½ units
7. History: c.....	See Page 39.....	1 unit
8. Electives.....	See Page 39.....	3½ units

Total 14 units

Pre-Medical Course. For admission to this course the following subjects are required:

1. English: a, b.....	See Page 32.....	3 units
4. Modern Languages: a or b..	See Page 36.....	2 units
5. Mathematics: a, b, c.....	See Page 37.....	3 units
6. Science.....	See Page 38.....	1½ units
7. History: c.....	See Page 39.....	1½ units
8. Electives.....	See Page 39.....	3½ units

Total 14 units

Advanced Standing. Candidates from other colleges must bring letters of honorable dismissal, and upon the presentation of acceptable certificates will be admitted to corresponding standing. Candidates for a degree must enter not later than the beginning of the senior year.

Requirements in Individual Subjects

1. English (3 units)

The books named in the following lists are prescribed for study in English:

Preparation for Part I (1½ units) should aim to give the

power of clear and accurate expression, and a general knowledge of the substance of the books. In an examination the candidate will be called upon to write a paragraph or two on each of several topics, to be chosen from a considerable number — perhaps ten or fifteen — set before him in the examination paper. In every case the ability to write good English will be regarded as more important than knowledge of the books. It is important that the candidate be instructed in the fundamental elements of rhetoric. No candidate will be accepted in English whose work is notably defective in point of spelling, punctuation, grammar, or division into paragraphs.

Preparation for Part II (1½ units) should include a thorough study of each of the works named below, so as to give a knowledge of the subject-matter, form and structure. In addition, the candidate should be well grounded in the essentials of English grammar, and in the leading facts in those periods of English literary history to which the prescribed works belong. For the latter part of the work, Newcomer's Introduction to English Literature and Moody and Lovett's First View of English Literature are recommended.

For students entering in 1914 and 1915, the books required for reading and study will be as follows:

List 1 for General Reading

At least ten units — each unit is set off by semicolons — are to be selected, two from each group.

Group I

The Old Testament, comprising at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings, and Daniel, together with the books of Ruth and Esther; the Odyssey, with the omission, if desired, of Books I, II, III, IV, V, XV, XVI, XVII; the Iliad, with the omission, if desired, of Books XI, XIII, XIV, XV, XVII, XXI; Virgil's Aeneid. The Odyssey, Iliad, and Aeneid should be read in English translations of recognized literary excellence.

For any unit of the above group a unit from any other group may be submitted.

Group II

Shakespeare's Merchant of Venice, Midsummer Night's Dream, As You Like It, Twelfth Night, Henry the Fifth, Julius Cæsar.

Group III

Defoe's Robinson Crusoe, Part I; Goldsmith's Vicar of Wakefield; either Scott's Ivanhoe or Quentin Durward; Hawthorne's House of the Seven Gables; either Dickens' David Copperfield or Tale of Two Cities; Thackeray's Henry Esmond; Mrs. Gaskell's Cranford; George Eliot's Silas Marner; Stevenson's Treasure Island.

Group IV

Bunyan's Pilgrim's Progress, Part I; The Sir Roger de Coverley Papers in the Spectator; Franklin's Autobiography; Irving's Sketch Book; Macaulay's Essays on Lord Clive and Warren Hastings; Thackeray's English Humourists; Selections from Lincoln, including at least the two Inaugurals, the Speeches in Independence Hall and at Gettysburg, the Last Public Address, and Letter to Horace Greeley, with a brief memoir or estimate; Parkman's Oregon Trail; either Thoreau's Walden, or Huxley's Autobiography and selections from Lay Sermons, including the addresses on Improving Natural Knowledge, A Liberal Education, and A Piece of Chalk; Stevenson's Inland Voyage and Travels with a Donkey.

Group V

Palgrave's Golden Treasury (First Series), Books II and III, with especial attention to Dryden, Collins, Gray, Cowper, and Burns; Gray's Elegy in a Country Churchyard and Goldsmith's Deserted Village; Coleridge's Ancient Mariner and Lowell's Vision of Sir Launfal; Scott's Lady of the Lake; Byron's Childe Harold (Canto IV.), and Prisoner of Chillon; Palgrave's Golden Treasury (First Series), Book IV, with especial attention to Wordsworth, Keats, and Shelley; Poe's Raven, Longfellow's Courtship of Miles Standish, and Whittier's Snow Bound; Macaulay's Lays of Ancient Rome, and Arnold's Sohrab and Rustum; Tennyson's Gareth and Lynette, Lancelot and Elaine, and The Passing of Arthur; Browning's Cavalier Tunes, The Lost Leader,

How They Brought the Good News from Ghent to Aix, Home Thoughts from Abroad, Home Thoughts from the Sea, Incident of the French Camp, Hervé Riel, Pheidippides, My Last Duchess, Up at a Villa—Down in the City.

List 2 for Minute and Critical Study

Shakespeare's *Macbeth*; Milton's *Lycidas*, *L'Allegro*, *Il Penseroso*, and *Comus*; either Burke's *Speech on Conciliation with America*, or both Washington's *Farewell Address* and Webster's *First Bunker Hill Oration*; either Macaulay's *Life of Johnson*, or Carlyle's *Essay on Burns*.

2. Greek (2 units)

a. **Grammar and Composition** (1 unit). The common forms, idioms, and constructions, and the general grammatical principles of Attic Greek prose. Translation into Greek of detached sentences and very easy continuous prose based upon the *Anabasis*.

b. **Xenophon** (1 unit). The first four books of the *Anabasis*.

In connection with the reading in Greek there should be constant practice in sight translation and in prose composition.

3. Latin (4 units)

a. **Grammar and Composition** (1 unit). The inflections; the simpler rules for composition and derivation of words; syntax of cases and the verb; structure of sentences in general, with particular regard to relative and conditional sentences, indirect discourse, and the subjunctive. Translation into easy Latin of detached sentences and very easy continuous prose based upon Caesar and Cicero.

b. **Caesar** (1 unit). Any four books of the *Gallic War*.

c. **Cicero** (1 unit). Any six orations from the following list, or equivalents: The four orations against Catiline, Archias, The Manilian Law, Marcellus, Roscius, Milo, Sestius, Ligarius, the fourteenth Philippic.

d. **Vergil** (1 unit). The first six books of the *Aeneid*, and so

much prosody as relates to accent, versification in general, and dactylic hexameter.

Equivalents in b, c, or d, will be accepted at the discretion of the head of the department.

Every student is required to use in the college class room the Roman Method of pronunciation, and is expected to have had practice in this method at school.

4. Modern Languages (2 units)

a. **German** (2 units). Two years' work will be necessary to meet this requirement.

During the first year the work should comprise: 1. careful drill upon pronunciation; 2. the memorizing and frequent repetition of colloquial sentences; 3. drill upon the rudiments of grammar, that is, upon the inflection of the article, of such nouns as belong to the language of every-day life, of adjectives, pronouns, weak verbs, and the more usual strong verbs; also upon the use of the more common prepositions, the simpler uses of the modal auxiliaries, and the elementary rules of syntax and word-order; 4. abundant easy exercises designed not only to fix in mind the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; 5. the reading of from 75 to 150 pages of graduated texts from a reader, with constant practice in translating into German easy variations upon sentences selected from the reading lesson, the teacher giving the English, and in reproducing from memory sentences previously read.

During the second year the work should comprise: 1. the reading of from 150 to 250 pages of literature in the form of stories and plays; 2. accompanying practice, as before, in the translation into German of easy variations upon the matter read and also in the off-hand reproduction, sometimes orally and sometimes in writing, of the substance of short and easy selected passages; 3. continued drill upon the rudiments of the grammar, with constant applications in the construction of sentences.

b. French (2 units). Two years' work will be necessary to meet this requirement.

During the first year the course should include: 1. careful drill in pronunciation; 2. the rudiments of grammar, including the inflection of the regular and the more common irregular verbs, the plural nouns, the inflection of adjectives, participles, and pronouns; the use of personal pronouns, common adverbs, prepositions, and conjunctions; the order of words in the sentence and the elementary rules of syntax; 3. abundant easy exercises, designed not only to fix in the memory the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; 4. the reading of from 100 to 175 duodecimo pages of graduated texts, with constant practice of translating into French easy variations of the sentences read, the teacher giving the English, and in reproducing from memory sentences previously read; 5. writing French from dictation.

During the second year the work should comprise: 1. the reading of from 250 to 400 pages of easy modern prose in the form of stories, plays, or historical or biographical sketches; 2. constant practice, as in the previous year, in translating into French easy variations upon the texts read; 3. frequent abstracts, sometimes oral and sometimes written, or portions of the text already read; 4. writing French from dictation; 5. continued drill upon the rudiments of grammar, with constant application in the construction of sentences; 6. mastery of the forms and use of pronouns, pronominal adjectives, of all but the rare irregular verb forms, and of the simpler uses of the conditional and subjunctive.

5. Mathematics ($2\frac{1}{2}$ units; 3 units; $3\frac{1}{2}$ units)

a. Algebra. ($1\frac{1}{2}$ units). The four fundamental operations for rational algebraic expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions, ratio and proportion; linear equations, both numerical and literal, containing one or more unknown quantities; problems depending on linear equations; radicals, including the extraction of the square root of

polynomials and of numbers; exponents, including the fractional and negative.

Simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations.

Problems depending upon quadratic equations.

The binomial theorem for positive integral exponents.

The formulas for the n th term and the sum of the terms of arithmetic and geometric progressions, with applications.

b. Plane Geometry (1 unit). The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle.

The solution of numerous original exercises, including loci problems.

Application to the mensuration of lines and plane surfaces.

c. Solid Geometry ($\frac{1}{2}$ unit). The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurement of prisms; pyramids, cylinders, and cones; the sphere and the spherical triangle.

The solution of numerous original exercises, including loci problems.

Applications to the mensuration of surfaces and solids.

6. Science ($1\frac{1}{2}$ units)

a. Physics (1 unit). An elementary knowledge of physics, such as may be gained by a year's course of study covering mechanics, sound, heat, light and electricity, as treated in any standard high school text book. Preparation should include individual laboratory work, attested by a note-book, comprising at least thirty-five exercises, chiefly quantitative.

b. Physiology ($\frac{1}{2}$ unit). A study of the nature of foods and their history in the body; the essential facts of digestion, absorption, circulation, secretion, excretion, and respiration; the motor,

nervous, and sensory functions; and the structure of the various organs by which these operations are performed. A note-book with careful outline drawings of the chief structures studied anatomically, together with explanations of these drawings, and the study of a good text-book are essential.

The above-named sciences are preferred. The following will be accepted. The figure in parenthesis shows the unit value:

- | | |
|------------------------|-----------------------------|
| c. Chemistry. | f. Botany.(1) |
| d. Biology.(1) | g. Physiography.(1) |
| e. Zoology.(1) | |

In every instance the work expected is that outlined for the given subject in the reports of the College Entrance Examination Board and the Carnegie Foundation, or in the Syllabus of the New York State Education Department.

7. History (1 unit; 2 units)

a. **Greek History** ($\frac{1}{2}$ unit). In this study must be included the geography of ancient Greece.

b. **Roman History** ($\frac{1}{2}$ unit). In this study must be included the geography of the Roman Empire.

c. **History of the United States** (1 unit).

Elementary United States history will be accepted if the candidate presents in addition a year of history not otherwise required.

8. Electives ($\frac{1}{2}$ unit; 3 units; $3\frac{1}{2}$ units)

In completing the requirements for admission to each course a fixed number of elective units in subjects not already taken from other groups must be offered from the list below.

- | | |
|---|-----------------------|
| For admission to the A. B. course..... | 2 $\frac{1}{2}$ units |
| For admission to the Ph. B. course..... | $\frac{1}{2}$ unit |
| For admission to the B. E. course..... | 3 $\frac{1}{2}$ units |
| For admission to the B. S. course..... | 3 $\frac{1}{2}$ units |

The figure in parenthesis after each subject shows the unit value of that subject.

Latin: 1, 2, 3, 4.... (4)	Greek History (½)
Greek: 1, 2, 3..... (3)	Roman History (½)
French 3 (1)	English History (1)
German 3 (1)	History of English Literature... (½)
Spanish 1 (1)	Plane Trigonometry (½)
Spanish 2 (1)	Spherical Trigonometry..... (½)
Civics. (½)	Drawing. (1)
Physics. (1)	Zoology. (1)
Chemistry. (1)	Botany. (1)
Physiology. (½)	Physiography. (1)
Biology. (1)	

Entrance Examinations in 1914.

Entrance examinations will be held at the college in June and in September, in accordance with the schedule given below. A fee of five dollars is required at the time of registration.

Only those who register at the appointed time will be admitted to the examinations of the following days.

Schedule of the June Examinations

Thursday, June 11

9 A. M. Candidates register at the office of the secretary.

Mathematics a. (Algebra complete).....	11 A. M. to	1 P. M.
Science, a, b	" "	" "
Science, c-g	2 P. M. to	4 P. M.
History a-c (American and ancient).....	" "	" "
English (Parts I and II).....	3 P. M. to	5 P. M.

Friday, June 12

Latin.....	9 A. M. to	11 A. M.
Mathematics c. (Solid Geometry).....	" "	" "
German (intermediate).....	11 A. M. to	1 P. M.
French (intermediate).....	" "	" "
Greek.....	2 P. M. to	4 P. M.
Mathematics b. (Plane Geometry).....	" "	" "
Mathematics d. (Plane Trigonometry).....	" "	" "

Schedule of the September Examinations

Monday, September 14

9 A. M. Candidates register at the office of the secretary.

Tuesday, September 15

History a-c (American and ancient).....	9 A. M. to	11 A. M.
Science a, b.	" "	" "
Mathematics a. (Algebra complete).....	11 A. M. to	1 P. M.
Mathematics b. (Plane Geometry).....	2 P. M. to	4 P. M.
Mathematics d. (Plane Trigonometry).....	" "	" "
Science c-g	" "	" "

Wednesday, September 16

Latin	9 A. M. to	11 A. M.
Mathematics c. (Solid Geometry).....	" "	" "
German (intermediate).....	11 A. M. to	1 P. M.
French (intermediate).....	" "	" "
Greek.....	2 P. M. to	4 P. M.
English (Parts I and II).....	3 P. M. to	5 P. M.

DEPARTMENTS OF INSTRUCTION

The Greek Language and Literature

PROFESSOR BENNETT AND MR. MAXON

The aim of the formal instruction in Greek is to impart an exact knowledge of the Greek language and a thorough acquaintance with a few good Greek books. The books read will be varied from year to year, except that, beginning in 1914-1915, the sophomore course will be in the Greek historians and in ancient history and will afford an introduction to the elective studies in history offered in the junior and senior years. Collateral reading in history, archaeology, art, and literature is required of all students in Greek. The courses for the year 1913-1914 are as follows:

1. **Homer:** Selected books of the Iliad and the Odyssey. **Plato:** The Apology, the Crito, and parts of the Phaedo. **Composition.** Capps's From Homer to Theocritus; Tarbell's History of Greek Art; Mahaffy's Old Greek Life; Tozer's Classical Geography.

Required of freshmen in course A. Four hours weekly throughout the year.

2. **Aristophanes:** The Clouds. **Euripides:** The Medea. **Demosthenes:** The Orations against Philip. **Composition.** Capps's From Homer to Theocritus; Tarbell's History of Greek Art; Dickinson's The Greek View of Life.

Required of sophomores in course A. Three hours weekly throughout the year.

3. **Xenophon:** The Anabasis. **Composition.** Botsford's History of the Ancient World.

Required of students in course B of the class of 1916. Three hours weekly throughout the year.

4. **Homer:** The Iliad, the Odyssey, and the Homeric Hymns. Capps's From Homer to Theocritus; Jebb's Introduction to Homer; Dickinson's The Greek View of Life.

Elective for juniors and seniors in course A. Three hours weekly throughout the year.

5. The New Testament: The Gospels; the Acts of the Apostles; the First Epistle to the Corinthians; Revelation. **Composition.** Capps's From Homer to Theocritus; Tarbell's History of Greek Art; Dickinson's The Greek View of Life.

Required of students in course B of the class of 1915. Three hours weekly throughout the year.

6. The New Testament: The Gospels. **Plato:** The Apology, the Crito, and parts of the Phaedo. Capps's From Homer to Theocritus; Tarbell's History of Greek Art; Dickinson's The Greek View of Life.

Required of students in Course B of the class of 1914. Three hours weekly throughout the year.

7. Plato: The Republic. **Aristotle:** The Nicomachean Ethics. **Thesis.**

Required for **Honors**. Three hours weekly throughout the year. Candidates for honors are required also to take Greek 4 and Latin 4.

The courses leading to the degree of bachelor of arts at Union College are classical courses, Greek as well as Latin being required of all candidates for that degree. Two courses are offered. For admission to course A Greek is required; it is continued during the freshman and sophomore years and may be elected during the junior and senior years. Honors are awarded to qualified candidates in this course. Course B is open to students in the course leading to the degree of bachelor of philosophy who are proficient in the study of Latin during the freshman and sophomore years. At the time appointed for choosing juniors electives such students may elect to become candidates for the degree of bachelor of arts. They must then take up the study of Greek and continue it for five hours weekly during the junior and senior years. With this exception and that of English composition election is free for classical students in the two latter years and may be made in any of the main departments of knowledge taught. The modern language taken in the sophomore year of course A may be continued and other modern languages begun. Preparations to meet requirements of medical colleges in science may be made by election. Course B as given prior to 1913-1914 is no longer offered except for students already entered in it.

The Latin Language and Literature

PROFESSOR KELLOGG

The studies of this department are required, in the freshman and sophomore years, of all students who are candidates for

either one of the two degrees, A. B. and Ph. B. In the junior and senior years Latin becomes an elective study, except for students who are candidates for honors in Latin; of them it is required.

1. **Livy:** Selections from Books I, XXI and XXII. Roman history. **Tacitus:** Agricola and Germania. **Cicero:** De Senectute or De Amicitia or De Officiis (Book I). Latin composition.

The work of the first year includes a thorough review of forms and syntax through oral and written prose composition and sight reading. Selections from the three great masters of Roman prose are made the basis for grammatical and literary analysis and interpretation, and also, through lectures and assigned reading, for the study of Roman history through the reign of Trajan.

Required of freshmen in the A. B. and Ph. B. courses. Four hours weekly throughout the year.

2. **Terence:** Adelphoe. **Plautus:** Menaechmi or an equivalent. **Horace:** Selected Odes and Epodes. **Catullus:** Selected poems.

Through lectures on ancient comedy and lyric, and by collateral reading, the student is made acquainted with the history of Roman literature under the Republic. The grammatical analysis aims to make familiar the chief characteristics of early and colloquial Latin, and the general economy of poetic diction; the literary interpretation centers chiefly around the influence of Greek life and thought on Roman literature, and the national and personal elements in Latin poetry.

Required of sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. **Horace** (Satires and Epistles) and **Juvenal**. **Pliny the Younger** or **Cicero** (Letters).

This course, through lectures and assigned reading, continues the history of Roman literature under the Empire. A brief introduction to Roman archaeology (with special study of the Forum Romanum) will be given, and in connection with the Pliny an outline of the private life of the Romans.

Elective for juniors in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

4. **Lucretius:** Books III and V and Selections, with lectures on didactic poetry, the atomic theory, and the philosophic system of Epicurus. The literature of the Empire will be illustrated by readings from **Seneca** (Moral Epistles) or **Quintilian** (Book X on literary criticism) or **Suetonius** (Lives of Julius Caesar and Augustus) or **Martial** (Selected Epigrams).

As this course is not only for those who elect to study Roman life and literature but also for those who may desire to use Latin in teaching or as an instrument in later research work, special assignments are given from authors or inscriptions for practice in editing, or the writing of history from the sources.

Elective for seniors in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

5. **Roman Law.** When a sufficient number of seniors electing course 4 desire it, the second and third terms in course 4 will be devoted to an Introduction to Roman Law, based on the Institutes of Justinian and Robinson's Selections from Roman Law.

In general, subsidiary reading will be recommended. Equivalents may be substituted in the elective programme at any time, and the order of the subjects as given above may be altered in any one of the four years at the discretion of the head of the department.

6. **Honor Course.** Studies in the life and works of Vergil. Open to seniors who have complied with the requirements for special honors. Three hours weekly throughout the year.

Modern Languages

PROFESSOR BARNES, ADJUNCT PROFESSOR MARCH

ASSISTANT PROFESSOR STEWART AND MR. WISEWELL

These courses have a twofold object, to give the student such control of the language that he may be able to use it as an instrument in study and research, and to open to him another path to general training and culture. They aim to enable him to read modern texts without translation and to give him some facility in the independent use of the language. In the academic courses the literary side of the study is made prominent; in the

engineering division emphasis is laid on those phases of the language which are peculiar to technical and scientific writing. From the beginning the language studied is made so far as possible the language of the class room.

German

1. **Elementary I.** Grammar and reading; drill on inflection and the more usual constructions, with special attention to pronunciation and vocabulary. Bierwirth's Beginning German is used, and portions of Huss's German Reader and Gore's German Science Reader are read, with such other selections as are adapted to the progress of the class.

Required in the B. E. course of freshmen who offer French at entrance. Three hours weekly throughout the year.

1a. **Intermediate I.** Grammar for review and reference; exercises in syntax; practice in writing German. The reading of the class is mainly in Scientific German, but other matter is also read and suitable selections are assigned for outside study and made the basis of tests and themes. In any year the equivalent of at least two of the following scientific works and one of the others will be read:

Wallentin: Grundzüge der Naturlehre

Du Bois-Reymond: Wissenschaftliche Vorträge

Lassar-Cohn: Die Chemie im täglichen Leben

Muller: Die elektrischen Maschinen

Hauff: Lichtenstein; Freytag: Das Nest der Zaunkönige, Soll und Haben; Sudermann: Frau Sorge; Storm: Der Schimmelreiter; Meyer: Das Amulett, Der Heilige.

Required in the B. E. course of freshmen who offer German for entrance. Three hours weekly throughout the year.

1b. **Intermediate III.** First term: (a) Grammar for review and reference, with exercises and drill on syntax; Thomas's Practical German Grammar. (b) Written composition and reproduction, with colloquial practice and work in vocabulary building based on a course in German composition. Second and third term: Reading and discussion of works selected from the classics, from nineteenth century drama and fiction, and

from historical writings. In 1914-15 one or more works from each of at least four of the following groups will be read:

Lessing: *Minna von Barnhelm*, *Emilia Galotti*

Goethe: *Götz von Berlichingen*, *Egmont*

Schiller: *Maria Stuart*, *Die Jungfrau von Orleans*

Freytag: *Die Journalisten*; Moser: *Der Bibliothekar*; Ernst: *Flachsmann als Erzieher*.

Chamisso: *Peter Schlemihl*; Ludwig: *Zwischen Himmel und Erde*; Hauff: *Lichtenstein*; Freytag: *Soll und Haben*; with others to be assigned for outside reading.

Sybel: *Die Erhebung Europas gegen Napoleon*; Ranke: *Kaiserwahl Karls des V*; Freytag: *Bilder aus der deutschen Vergangenheit* (selections); Schiller: *Egmonts Leben und Tod*.

Required in the Ph. B. and B. S. courses of freshmen who offer German for entrance. Five hours weekly throughout the year.

Sophomores who offer French for entrance but have also had two years of German take this course in place of German 2.

2. Elementary II. A course in grammar, composition and reading; easy selections in prose and poetry, historical matter, a novel and a play are read; while thorough preparation and careful drill are insisted upon throughout, the amount of reading demanded is considerable. Bierwirth's *Beginning German* and Hewett's *German Reader* are used.

Required in the Ph.B. and B.S. courses of sophomores who offer French at entrance. Elective for juniors in the A. B. course. Five hours weekly throughout the year.

Sophomores in the A. B. course take either German 2 or French 2, and may if they wish elect the alternate in their junior year.

3. Intermediate II. First term: (a) Grammar reviewed and continued, with chief attention to the derivation and composition of the several parts of speech, case and verb construction, idioms, and the translation of English into German; Joynes-Meissner *German Grammar* and Pope's *German Composition*. (b) Reading and vocabulary study based on Meyer-Försters *Karl Hein-*

rich. Second and third terms: Rapid reading of one or more works from each of the following groups:

Schiller: Wilhelm Tell, Historische Skizzen

Goethe: Götz von Berlichingen, Hermann und Dorothea

Sudermann: Frau Sorge, Der Katzensteg

Elective in the A. B., Ph. B. and B. S. courses of juniors who have passed German 2 with a grade of 80 or more, or German 1b with a grade between 70 and 85. Three hours weekly throughout the year.

3a. Advanced II. Course (a) below and one of the others, or parts of two or more of them:

a) Advanced composition (Lange), with short independent essays; studies in words and their uses (Hastings), with some drill on derivations and etymology; journalistic German (Prehn), with sight readings from current newspapers and periodicals.

b) A study of some of the more recent prose literature, especially the novel; works of Storm, Keller, Meyer, Sudermann, and others.

c) A continuation of the classics begun in German 1b; reading and discussion of additional works of Lessing, Schiller and Goethe; Biedermanns, Deutsche Bildungszustände im 18. Jahrhundert.

d) An intensive study of Schiller's life and works.

e) A course of reading in nineteenth century drama, with special attention to Kleist, Hebbel, Grillparzer and Hauptmann.

Elective in the Ph. B. and B. S. courses for juniors who have passed German 1b with a grade of 85 or more. Three hours weekly throughout the year.

4. Advanced I. Language and literature.

a) Advanced composition, with independent themes based on the reading of course (c) below.

b) Kochs Geschichte der deutschen Literatur as a handbook, with lectures, and references to other works.

c) A study of the classical period; Lessing, Goethe and Schiller are discussed in this order and chief attention is given to the following works:

Lessing: Emilia Galotti, Nathan der Weise

Goethe: Faust I (with readings on the Faust legend)

Schiller: Maria Stuart, Jungfrau von Orleans, Wallenstein (with this are read selections from Der 30 jährige Krieg)

Elective in the A. B., Ph. B. and B. S. courses for seniors who have passed German 3 with a grade of 80 or German 3a with a grade between 70 and 85. Three hours weekly throughout the year.

4a. Advanced III. Course (a) below and one of the others, or parts of two or more of them.

a) Advanced composition (Lange, continued), with original themes on subjects connected with the reading of the course.

b) A study of Goethe's life and works, with readings from *Dichtung und Wahrheit*, and the poems; *Egmont* (with this is read Schiller's *Egmonts Leben und Tod*), *Iphigenie auf Tauris*, *Torquato Tasso*; *Faust I*, with readings on the Faust legend in literature.

c) A history of German literature, based on Kluges *Geschichte der deutschen National-Literatur*, with assigned studies and parallel readings from an anthology.

d) A course in Middle High German, based on Wright's *Middle High German Primer* as a text book, with supplementary exercises from other sources. This is a one-term course and may in any year be given as a part of the first half-year's work of (c) above.

Elective in the Ph. B. and B. S. courses for seniors who have passed German 3a with a grade of 85 or more. Three hours weekly throughout the year.

French

1. Elementary I. A beginner's course in grammar and reading with special attention to pronunciation, vocabulary, and the common forms and idioms. Aldrich and Foster's *Elementary French* and Super's *Reader* are used, with such other reading as may be suited to the class.

Required in the B. E. course of freshmen who offer German at entrance. Three hours weekly throughout the year.

1a. Intermediate I. This course consists of (a) a rapid re-

view of the elements of grammar, and the study of syntax and composition (Koren's French Composition and Armstrong's French Verb); (b) Practice in pronouncing and reading French, by means of reading, dictation, and some conversation; (c) Careful translation. In 1914-15 the books read will be:

Daudet: *Tartarin de Tarascon* (Siepmann)

French Short Stories (Buffum) and one or more of the following:

Dumas: *La Tulipe Noire*; Feuillet: *Le Roman d'un Jeune Homme Pauvre*; Hugo: *Hernani*; La Brète: *Mon Oncle et mon Curé*; Labiche et Delacour: *La Cagnotte*; Sand: *La Petite Fadette*.

Required in the B. E. course of freshmen who offer French for entrance. Three hours weekly throughout the year.

1b. Intermediate III. This course is like 1a, but includes a wider range of reading, so as to give a general view of the history of French literature. Among the additional books that are read may be:

Corneille: *Le Cid*; Molière: *l'Avare*; Racine: *Athalie*; Bossuet: *Selections*; Le Sage: *Gil Blas*; Beaumarchais: *Le Barbier de Seville*; and selections from *La Lyre Française* (Masson) and *Lanson's Histoire de la Littérature Française*.

Required in the Ph. B. and B. S. course of freshmen who offer French for entrance. Elective in the A. B. course of juniors who have had two years of French before entrance. Five hours weekly throughout the year.

Sophomores who offer German for entrance but have also had two years of French take this course in place of French 2.

2. Elementary II. A beginner's course in grammar and reading. This course is similar to French 1, but includes more work in composition and reading. Aldrich and Foster's *Elementary French* and Comfort's *Prose Composition* are used. The reading may include:

Halevy: *L'Abbé Constantin*; Sand: *La Mare au Diable*; La Biche et Martin: *Le Voyage de M. Perrichon*.

Required in the Ph. B. and B. S. course of sophomores who

offer French at entrance. Elective for juniors in the A. B. course. Five hours weekly throughout the year.

Sophomores in the A. B. course take either French 2 or German 2, and may if they wish elect the alternate in their junior year.

3. Intermediate II. Grammar reviewed; exercises in vocabulary, idioms and the spoken French in connection with Daudet's *Tartarin de Tarascon* (Siepmann). This work is followed by composition and reading. Koren's *French Composition* is used. The books read may be:

Zola: *la Débâcle*; Souvestre: *Un Philosophe sous les Toits*; De Musset: selections.

Elective in the A. B., Ph. B. and B. S. courses for juniors who have passed French 2 satisfactorily, or French 1b with a grade of not less than 80. Three hours weekly throughout the year.

3a. Advanced II. A reading course in nineteenth century literature. Lanson's *Histoire de la Litterature Française* is followed and discussed, and a considerable amount of modern French is read out of class and reported upon. The college library is called into use, and the student should gain some real acquaintance with certain of the modern authors. One hour a week is given to advanced composition, including translations and the writing of themes.

Elective in the Ph. B. and B. S. courses for juniors who have passed French 1b with a grade of 85 or more. Three hours weekly throughout the year.

4. Advanced I. This course is devoted to the study of some of the classics of the seventeenth century. Selected works of Corneille, Racine, Molière, La Fontaine, and Bossuet are read, together with parts of Lanson's *Histoire de la Litterature Française*. One hour a week is devoted to syntax and composition. Armstrong's *French Verb* is used.

Elective in the Ph. B. and B. S. courses for seniors who have passed French 3. Three hours weekly throughout the year.

4a. Advanced III. This course is devoted to the study of Molière, his life, his works, and his age.

Elective in the Ph. B. and B. S. courses for seniors who have

passed French 3a satisfactorily. Three hours weekly throughout the year.

Spanish

1. **Junior Elective.** Grammar and reader; practice and sight translation. Selections from Gil Blas, a recent novel and a modern play are read.

Open to juniors in the A. B., Ph. B. and B. S. courses and to seniors in those courses who have not had Spanish in junior year. Three hours weekly throughout the year.

2. **Senior Elective.** Grammar and composition. One or two dramas of the classical period and one or two modern plays are read, together with some works of recent fiction.

Open to seniors in the A. B., Ph. B. and B. S. courses who have had Spanish I. Two hours weekly throughout the year.

The English Language and Literature

PROFESSOR HALE AND ASSISTANT PROFESSOR CHASE

Courses 1, 2, and 3 are required courses as noted. The advanced courses are arranged so as to form the following three electives, each of which is a connected course of study lasting through junior and senior years:

a) The General Elective (comprising courses 4 and 7). This elective is recommended to those students who are not doing special work in the department.

b) The Major Elective (comprising courses 5 and 8).

c) The Special Honor Elective (comprising courses 6 and 9).

A student taking English as a major must take (a) and (b). A student working for special honors must take (c) and either (a) or (b). For any student, however, who wishes both to take English as a major and to work for special honors, an arrangement will be made by which only two courses each year will be required.

1. **Rhetoric and Composition.** The aim of this course is to train the student in the use of clear and correct English, written and spoken. The work will consist of the study of rhetorical principles and practice in composition. In 1913-14 Scott and

Denney's New Composition Rhetoric and Woolley's Handbook of Composition were used as text-books. A certain amount of outside reading from English authors will also be assigned. Usually, two short themes a week will be required, and at intervals of six weeks longer themes. Each student will meet the instructor in personal conferences for advice about his individual work.

Required of freshmen in all courses. Three hours weekly throughout the year in the A. B., Ph. B. and B. S. courses; two hours weekly throughout the year in the B. E. course.

2. Essays. The practice of English composition will be carried on throughout the course. As a rule two essays a term will be written, which will be corrected and criticised in individual conferences with the instructor.

Required of sophomores, juniors and seniors in all courses. The requirement for senior engineers includes but one literary essay.

3. Introduction to English Literature. This course has two objects: an intimate acquaintance with a few masterpieces of English literature, and a knowledge of the historical development of the literature. A. J. Wyatt's History of English Literature from 1579 is used as a text-book. In the fall term the reading is mainly from the plays of Shakespeare; in the winter term, from writers of the classical period; in the spring term, from writers of the nineteenth century.

Required of sophomores in all courses. Three hours weekly throughout the year in the A. B., Ph. B. and B. S. courses; two hours weekly throughout the year in the B. E. course.

4. Modern English Literature. The object of this course is a general knowledge of literature, based on the more important literary forms. Fiction, drama and poetry are studied in fall, winter, and spring terms respectively. The study of Fiction deals with the theory of the novel, as exemplified by the work of the chief English and American novelists of the nineteenth century. The special works selected for the winter term are the more important tragedies of Shakespeare. The work of the spring

term gives an introduction to the critical study of poetry, Page's *British Poets of the Nineteenth Century* being used as a text-book.

Elective for juniors in all courses. Three hours weekly throughout the year.

5. Early English Literature. During the first two terms *The Canterbury Tales* are read and as much of Chaucer's other work as time permits. There is a certain amount of linguistic study, which is necessary for an intelligent reading of the text; but the end in view is an understanding of Chaucer's literary skill and his relations to the age in which he lived. In the spring term the work is in simple Anglo-Saxon prose, such as may be found in Bright's *Reader*.

Elective for juniors in all courses. Three hours weekly throughout the year.

6. A History of Criticism. This course is designed to acquaint the student with the comparative method in the study of literature. The main influences affecting English critical thought in successive periods are pointed out, and the development is traced by means of extended reading in the critical documents themselves. A part of the year is devoted to some more limited topic, such as *The Transition from the Neo-Classical to the Romantic School in England*. Each student is required to write an essay of considerable length on a special topic suggested by the course.

Elective for juniors in all courses. Three hours weekly throughout the year.

7. Modern English Literature. This course follows closely the plan of course 4, of which it is a continuation. The divisions are, as before, fiction, drama, poetry. The particular topics taken up each year may vary somewhat according to the work of the preceding year. In the fall of 1913 the subject considered was *American Fiction of the present year*.

Elective for seniors in all courses. Three hours weekly throughout the year.

8. Old English and Historical Grammar. *Béowulf* is read in

the fall term. The rest of the year is devoted to the history of the English language, with especial attention to the phonology and the relations of Old and Modern English to the other Teutonic languages, the general principles of phonetics and spelling, word formation including inflections, vocabulary including changes of meaning, and syntax.

Elective for seniors who have taken course 5. Three hours weekly throughout the year.

9. The Critical Positions of To-day. This course is a continuation of course 6. It deals more particularly with the schools of criticism of the nineteenth century and with the chief developments in their critical ideas in the literary world to-day. The object of the course, however, is to give a way of looking at literature rather than a knowledge of the history of criticism. The essay written in the course is some original study of an author that may illustrate principles dealt with in the course.

Elective for seniors who have taken course 6. Three hours weekly throughout the year.

Rhetoric and Public Speaking

PROFESSOR MCKEAN

10. Sophomore Orations. The work consists of three distinct parts; (a) the writing of orations under individual criticism; (b) the special preparation of this work for oral presentation, under individual criticism based upon the general principles of public speaking and upon the personal needs of the student; and (c) the delivery of these orations before the class, subject to still further criticism for general instruction.

Required of sophomores in the B. E. course. One hour weekly throughout the year.

11. Junior Orations. The work is like that of course 10, but of an advanced character.

Required of juniors in all courses. One hour weekly throughout the year.

12. Senior Orations. The work is like that of course 10, but of a more advanced character.

Required of seniors in the A. B., Ph. B. and B. S. courses. One hour weekly throughout the year.

13. Argumentation and Debate. The work consists of two distinct parts: (a) the study of the theory of argumentation and debate, pursued by means of recitations, criticisms, discussions and informal lectures, based upon a text-book; and (b) considerable practice in the analysis of subjects for debates, in the preparation of briefs and arguments, and in the more formal debates of the class room—all subject to criticism and discussion.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

14. Advanced Argumentation and Debate. The work is of a more advanced character than that in course 13, and consists principally of class-room debates throughout the year, formally conducted and subject to criticism and discussion.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have completed course 13. Two hours weekly throughout the year.

History and Government

PROFESSOR RIPTON

The work of the department covers three years, beginning with the first term of the sophomore year. The instruction is given by text-book, by lectures, and by library references.

1. Medieval and Modern History. The course begins with a brief study of the Roman Empire and the contribution of the ancient world to modern civilization. Attention is given to events which have had permanent influence upon the historical development of Europe, and to institutions of enduring importance; among these may be named the medieval church, the feudal institutions, the French monarchy, and the English constitution. The course is designed to form a foundation of historical knowledge which may serve as a preparation for any further study, and to give to the student some acquaintance with methods of historical study and the use of authorities and sources.

Required of sophomores in the A. B., Ph. B. and B. S. courses, and of juniors in the B. E. course, Option B. Four hours weekly throughout the year. In 1913-14, two hours weekly.

2. American History. A study is made of the period of American discovery and exploration and of the colonial period. The main part of the work, however, begins with an examination of the causes of the American Revolution. The course is guided by text-books and lectures, and much work is done in the library among the sources and authorities.

Elective for seniors and juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Required of juniors in the B. E. courses. Two hours weekly throughout the year.

3. French Revolution and Nineteenth Century. This course considers the causes, ideas and progress of the French Revolution and the reconstruction of European politics and society produced by the revolutionary and Napoleonic wars. Attention is then directed to the development of the spirit of nationality, especially in Italy and Germany, and a careful study is made of the political, economic and social progress of Great Britain and the continental states. The course is designed to give a clear understanding of conditions in Europe to-day and the historical processes by which they were brought about.

Elective for juniors and seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

4. Comparative Politics. (Assistant Professor Hill) A comparative study is made of the constitutions and governments of England, the United States, and the principal nations of continental Europe. Sufficient attention is given to historical origins to account for characteristics differences, but the work consists mainly of a systematic study of the constitutions, their adoption and methods of amendment, the distribution of governmental powers, and their practical operation, including some account of political parties. The course concludes with a study of the principles of International Law.

Elective for Seniors in the A. B., Ph. B. and B. S. courses.

Required of Seniors in the B. E. course, Option B. Three hours weekly throughout the year.

5. **Honors.** A course in the Constitutional History of England is offered to candidates for special honors in history. Senior year, three hours weekly.

Philosophy

PROFESSOR HOFFMAN

The courses in this department begin with the first term of the junior year and extend through the entire senior year. Logic, elementary psychology and elementary ethics come in the junior year. The more advanced courses, with special studies in philosophy, are taken up in the senior year. Instruction in the various studies of the department is usually given by means of lectures, discussions, and the use of a text-book.

1. **Logic.** This study is confined to the simple elements of the science. As soon as the rules of correct thinking are mastered, the student is put at once to the analysis of arguments, the chief purpose of the study being to develop skill in detecting fallacies. Extracts from many authors are brought before the class for criticism, and so far as possible they are taken from every field of thought.

Elective for juniors, in the A. B., Ph. B. and B. S. courses; open to seniors in the B. E. course, electrical division. Three hours weekly during the first term.

2. **Elementary Psychology.** This course is designed to acquaint the student with the most obvious facts of his mental experience; and the attempt is made to classify these facts into a system. The relation of psychology to the other sciences is set forth, and the importance of the study is emphasized in that it lays the foundation for all the sciences of man as a political, moral and religious being.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term.

3. **Elementary Ethics.** Only the outlines of the subject are presented in this course. The ordinary duties of man are pointed

out by first describing those concerning himself and those that arise from his relation to others, to nature, and to God.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. Advanced Psychology. The chief problems discussed in this course are the recent views concerning the nature of perception, the localization of functions and the theories concerning memory, conception, the emotions and the will. The facts of abnormal psychology are also here considered, especially insanity, dreams, hypnotism, telepathy, and the hypothesis of a secondary self.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during first term.

5. Advanced Ethics. Some account of the history of ethics is given in this course, and present ethical theories are stated and discussed. The relation of ethics to other sciences is emphasized and much attention is given to the ethical problems involved in such questions as education, taxation, transportation, corporations, the treatment of criminals, the care of the poor, and the formation and dissolution of the family.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during second term.

6. Evolution of Religion. The object of this course is to show how religion originates and to trace out the steps taken in its development. The chief ideas of the leading religions of the heathen world are critically examined, their excellencies and defects are pointed out, and a comparison of them is made with the special doctrines of the Christian system.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

7. History of Philosophy. The attempt is made in this course to go over with considerable detail the general field of philosophy from the earliest times down to the present day. In this way the views of the principal thinkers of the world are presented and discussed upon a great variety of problems, such as the validity

of knowledge, the nature of virtue, the foundations of the State and the existence of God. Much is made in this course of the historical connection of the different systems for the purpose of impressing upon the mind of the student the successive steps that have been taken in the actual development of thought.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. Honors. Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Economics and Sociology

ASSISTANT PROFESSOR HILL

1. Elements of Economics. A survey and descriptive study of economic life is made the foundation in this course, following which there is an examination of the principles of consumption, production, exchange and distribution. This requires two terms of work, following which, in the third term, special economic problems are more carefully and intensively considered.

Required of seniors in the B. E. course, option B. Elective for juniors and seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the year. Prerequisite course: History 1.

2. Elements of Economics. This course is designed particularly for engineering students and includes a brief descriptive survey of economic life followed by an examination of fundamental economic principles in relation to modern industry.

Required of seniors in the B. E. course; G. E., option A, and C. E. Three hours weekly during the first or third term.

3. Economic History of the United States. This course requires a study of the industrial and commercial development of the country and an examination of industrial, commercial and financial policies at various periods. The student thus becomes familiar with the chief problems of our national life, both at home and abroad.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first term. Prerequisite course: Economics 1.

4. Money and Banking. This course outlines briefly the general problems of money and banking, including a study of principles and practice.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term. Prerequisite courses: Economics 1 and 3.

5. Public Finance. The student becomes acquainted, in this course, with theory and principles of public finance. He also examines policies relating to public revenues and expenditures.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the third term. Prerequisite courses: Economics 1, 3 and 4.

6. Elementary Sociology. In this descriptive and analytical course on social phenomena the student becomes familiar with the general characteristics and principles of human association and social activity. This requires one term of work which is followed by a careful study of special social problems during the second term. This course prepares the student for concluding studies in charities and corrections.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first and second terms.

7. Charities and Corrections. A study is made of the facts and causes of poverty, crime, degeneracy and dependency. The proper treatment of dependents and delinquents is considered especially in relation to public welfare.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the third term.

8. Honors. Special honors in Economics are offered to seniors in the A. B., Ph. B. and B. S. courses who are qualified to pursue them.

Mathematics

PROFESSOR GARIS AND MR. MAXON

Mathematics is required in the A. B. and Ph. B. courses during the freshman year and is elective during the sophomore, junior and senior years. In the B. S. course mathematics is required during the freshman and sophomore years and is elective during the junior and senior years. The object of the instruction in these courses is to train the student to clear and exact thinking and to provide him with a knowledge of mathematics broad enough to enable him to give instruction in preparatory schools or to pursue his studies further to good advantage.

The following courses are given:

1. Solid Geometry.

Required of freshmen in the A. B. and Ph. B. courses during the first term. Four hours weekly.

2. Higher Algebra.

Required of freshmen in the A. B. and Ph. B. courses during the second term. Four hours weekly.

2a. Higher Algebra.

Required of freshmen in the B. S. course during the first term. Five hours weekly.

3. Trigonometry.

Required of freshmen in the A. B. and Ph. B. courses during the third term. Four hours weekly.

3a. Trigonometry.

Required of freshmen in the B. S. course during a part of the second term. Five hours weekly.

4. Analytic Geometry.

Required of freshmen in the B. S. course during a part of the second term and during the third term. Five hours weekly.

4a. Analytic Geometry.

Optional for sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

5. Differential and Integral Calculus.

Required of sophomores in the B. S. course and elective for juniors in the A. B. and Ph. B. courses who have had 4a. Three hours weekly throughout the year.

6. Advanced Calculus.

Elective for juniors in the B. S. course and for seniors in the A. B. and Ph. B. courses who have had 5. Three hours weekly throughout the year.

7. Differential Equations.

Elective for seniors in the B. S. course who have had 6. Three hours weekly throughout the year.

8. Honors. Candidates will be given advanced work in various subjects suited to their special ability.

Open to seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

Mechanics and Physics

PROFESSOR OPDYKE

For students in the A. B., Ph. B. and B. S. courses, the work in mechanics and physics is elective and may be continued through the junior and senior years. A course in general physics, consisting of lectures and recitations, is accompanied or followed by one in laboratory work. The student may then take a course in mathematical physics, including one term of general astronomy; and this may be supplemented by a course leading to special honors.

For students in the B. E. course, the work in physics is required throughout the sophomore year; but a B. E. student, upon special vote of the faculty and in case his schedule of hours allows it, may elect physics as an extra subject during his junior and senior years. See courses 3, 4 and 5.

The collection of apparatus for the illustration of lectures is extensive. It has been secured largely from foreign makers and includes sets of standard pattern by Koenig, Duboscq, Ruhmkorff and others.

The courses in greater detail are as follows:

1. General Physics. This course is intended to give a general presentation of the facts and laws of physics. Experimental lectures, recitations and discussions aim to make the student familiar with the chief phenomena of the subject and their explanation.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

2. Laboratory Work. This course is open to those who are taking physics 1 or who have taken it and who have taken mathematics 4 or 4a, and consists of individual work by the students themselves in the laboratory, supplemented by lectures on some of the mathematical aspects of the subject omitted in 1. The experiments performed are such as allow accurate measurement of the quantities involved; and the results obtained are used to verify some general law, or to obtain some physical constant of nature.

Elective for juniors and seniors in the A. B., Ph. B. and B. S. courses. Two laboratory periods and one lecture period weekly throughout the year.

1a. General Physics for Engineers. This course treats the subject more mathematically than 1, and is given to students in the engineering course. The calculus is used, more especially during the second and third terms. Assuming some knowledge of the fundamental facts of physics, attention is paid to the discussion of the phenomena and their mathematical analysis, in so far as this is possible with the use of the more elementary analytical methods. The work consists of lectures, recitations and laboratory practice.

Required of sophomores in the B. E. course. Three, three and two classroom hours a week during the first, second and third terms, respectively; and one laboratory period a week throughout the year.

1b. General Physics M. This course is similar to but less extensive than physics 1 and 2 combined. It requires no mathematics beyond that required for admission to the B. S. course

and is intended for students in the one year course offered by the college in preparation for admission to the medical department of the university. It will be given when the number of such students warrants forming a separate class for them, apart from physics 1 and 2, required of them in 1913-1914.

Required in the Pre-Medical course. Two classroom hours and two laboratory periods throughout the year.

3. Mathematical Physics. This course is open to those who have taken physics 2 and mathematics 5, and aims to carry out and complete the mathematical discussion of some parts of the subject. A good knowledge of calculus is required, and an elementary knowledge of differential equations. Some time is devoted to a further study of differential equations as applied to physical problems, and through lectures and assignments of reading the student is introduced to more advanced work.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have taken 2 and open to juniors and seniors in the B. E. course, upon special vote of the faculty. Three hours a week during the first and second terms. This course and course 4 are intended to be elected together.

4. Spherical Trigonometry and Astronomy. A short course in astronomy is given, beginning with the study of spherical trigonometry. The course is general in character, including some reference to the simpler mechanical aspects of the subject.

Elective for seniors who have taken 3; required of juniors in the general engineering course, Option A, and in the sanitary engineering course; and open to other engineering students of the junior and senior classes, upon special vote of the faculty. Three hours a week during the third term.

5. Honors. Candidates for special honors in physics must complete all the regular work of the department and must pursue, in addition, a special course in advanced mechanics and physics three hours a week throughout the senior year, and must submit theses.

Chemistry

PROFESSOR ELLERY AND MR. SALATHE

The object of instruction in this department is to develop power of accurate observation and logical reasoning, and habits of careful work. Students who are planning special courses in chemistry, medicine, biology, geology, or other branches of natural science, will find the courses of great value. The laboratory facilities are convenient, the apparatus and chemicals are the best, and the chemical library contains recent books on various branches of the science.

1. General Chemistry. The course includes an exhaustive study of the non-metals and their compounds, together with the fundamental laws and theories of chemistry, a special study of the common metals, and a brief introduction to organic chemistry. Laboratory practice in the fall and winter terms is strictly quantitative, and in the spring term includes simpler methods of qualitative analysis involving the recognition of single metals and acid radicals in solution.

Required of sophomores in the B. E. course. Two recitations and one laboratory period weekly during the fall term; three recitations and one laboratory period weekly during the winter and spring terms.

1a. General Chemistry. This course is similar to course 1, in that it includes the study of metals and non-metals, theories and laws, but analytical work in the laboratory is limited to recognition of acid radicals in solution.

Required of freshmen in the B. S. course. Elective for juniors and seniors in the A. B. and Ph. B. courses. Two recitations and one laboratory period weekly throughout the year.

2. Descriptive Chemistry. This course covers a more exhaustive study of the metals than course 1, and acquaints the student with some of the applications of chemistry to engineering problems. The laboratory work comprises systematic examination of complex mixtures, particularly of those materials which are of especial interest to engineers.

Required of juniors in the B. E. course. Two recitations and two laboratory periods weekly during the fall term.

2a. Qualitative Analysis. A study of the reactions of bases and acids in solution, a course in blowpipe analysis, a systematic examination of complex solutions of metals and acids, and of complex solids.

Optional for sophomores in the B. S. course. Elective for seniors in the A. B. and Ph. B. courses, who have had course 1a. Three laboratory periods weekly throughout the year.

3. Quantitative Analysis. In this course the student becomes familiar with various gravimetric and volumetric methods of analysis.

Elective for juniors in the B. S. course who have had course 2a. Three hours weekly throughout the year.

Students who elect Quantitative Analysis will be expected to elect Course 1, General Physics.

4. Organic Chemistry. This course comprises analysis of organic compounds, the preparation of typical organic substances, and a thorough study of the principles and theories of organic chemistry

In addition to the analysis of organic compounds, students in this course will have opportunity to make molecular weight determinations by the vapor density method, and the boiling and freezing point method. They will also have opportunity to study the effects of electrolysis on typical organic compounds.

Elective for seniors in the B. S. course who have had course 3. Three hours weekly throughout the year.

Students who elect Organic Chemistry will be expected to elect Course 1, General Biology, if they have not already pursued that course in their junior year.

5. Sanitary Chemistry. This course includes a limited study of quantitative methods, a thorough course in water analysis, and a short course in milk analysis.

Required of seniors in the sanitary engineering course. Two hours weekly during the fall and winter terms.

6. Honors. Students who have done satisfactory work in

courses 1 and 2a, and who desire to emphasize chemistry in their college course, will be eligible for honors in the department. Such students will be required to do six credit hours of work in each of the junior and senior years and, at the close of the senior year, to pass an examination covering all the four years work. The time in the junior year will be given, in the fall and winter terms, to quantitative analysis, and in the spring term to working out some original problem involving analytical methods. In the senior year the work will include the regular course in organic chemistry, a course in physical chemistry, and reading of assigned works on general and industrial chemistry. At some time during the senior year the candidate will be expected to present a thesis describing his original work.

Biology and Geology

PROFESSOR STOLLER

1. General Biology. In this course, after an introductory study of cells and tissues, a series of types of plants and animals is studied with reference to structure, function and development. It is intended to make the work a discipline in the method of scientific study and to afford the student a knowledge of the broader facts and principles of biological science in their general philosophical values. Laboratory work, lectures and recitations, counting as a three-hour course.

Alternative with mathematics for sophomores in the B. S. course. Three hours weekly throughout the year.

2. Biology and Geology. This course is intended to afford a general knowledge of these sciences as branches of liberal culture. The treatment is general and philosophical rather than technical but constant use is made of illustrative material. The course includes a consideration of the scientific evidences of organic evolution and the theories of evolution of various authors.

Alternative with mathematics for sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. Sanitary Biology. This is a descriptive course treating of

bacteria as a group of organisms and especially of the applications of bacteriology in sanitation. Demonstrations of microscopic preparations and of culture methods in the examination of water and milk are given. Recitations and lectures, with demonstrations.

Required of seniors in the sanitary engineering course and in option A of the general engineering course. Two hours weekly during the second term.

4. Animal Morphology. This course is adapted for students who wish a somewhat advanced knowledge and training in biology, especially as a preparation for the medical profession. The work is mainly in the line of comparative anatomy and embryology and includes the dissection of several vertebrate types, including a mammal, in detail.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

5. Pre-Medical Biology. This course has been arranged to meet the requirement of the medical department of Union University (see page 28). The work consists of laboratory work in anatomy, histology and embryology and of a text-book course in biology, together counting as a four-hour course. Required of freshmen who register for the one-year pre-medical course.

6. Mineralogy and Geology. This course consists largely of laboratory and field work. It begins with the determination of common minerals and rocks. Structural and historical geology, especially as illustrated by the formations of the Mohawk valley and the Helderberg region are then taken up. Along with the practical work a text-book course in general geology is given.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Students electing this course are required to take as a collateral science course the course in general physics.

7. Economic Geology. In this course after an introductory study of the principles of structural geology the work is related to the occurrence and distribution in the United States of build-

ing stones and materials, mineral ores, coal and other economic products.

Required of seniors in the B. E. courses, general and sanitary divisions. Two hours weekly during the first term.

8. **Glacial Geology. Honor Course.** A detailed study of the the deposits of the Pleistocene period as occurring in the region of the lower Mohawk valley and the interpretation of the conditions under which they were laid down. Also a general study of the glacial period of geological history. This course includes at least 60 hours of field work. Prerequisite courses: 1 (or 2) and 6.

Physiology and Physical Training

DR. MCCOMBER

Human anatomy, physiology, hygiene and physical training are required in all courses. The work consists of recitations and lectures, demonstrated by means of the microscope, the manikin and the human skeleton. An attempt is made to give a practical course covering the essential facts of the subject with the idea of arousing in every student a genuine self interest, of developing a wholesome self respect without overwhelming him with the mass of details that must be considered in a close study of anatomy.

The course in hygiene is designed to acquaint the student with practical laws concerning the preservation of health and to impress upon his mind the dependence of health upon the consistent observance of such laws. Knowledge is of little value unless it find some application. Lectures on first aid to the injured, bacteriology, contagious and infectious diseases and social purity form a part of the course.

It is the aim of the department to give the student such a training in the methods of physical education that he may have a comprehensive knowledge of the subject, and to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Work in the gymnasium is required of freshmen only, but the

organization of voluntary classes makes it possible for all to secure the advantages of systematic exercise. The course in the gymnasium is so arranged as to give a knowledge of the different kinds of apparatus pertaining to physical training. Commencing with light work, consisting of free gymnastics, club, dumb-bell and wand exercises, the course leads through a graded series, involving heavier work as the student becomes fitted for it.

Freshmen are required to pass an examination in gymnastics at the end of the winter term, credit being based upon actual proficiency in the various exercises as indicated by such examination.

A physical examination of new students is made at the beginning of the year and corrective exercises are prescribed for the remedy of physical defects. Charts of the physical measurements showing the comparison of the individual with the normal development and hand books containing much valuable hygienic data are furnished upon payment of a small fee. All candidates for college teams are required to pass a satisfactory physical examination before they are allowed to compete in athletic contests.

It is the policy of the department, so far as the equipment will permit, to influence the entire student body to take an active part in athletic sports and gymnastics and not to cater to the exceptional athlete to the exclusion of those who are physically less perfectly equipped.

1. Physiology and Hygiene.

Required of freshmen in all courses during the first and third terms. Required of freshmen in the academic courses only during the second term.

2. Gymnasium.

Required of freshmen in the academic courses. Two periods weekly during the second and third terms.

2a. Gymnasium.

Required of freshmen in the engineering courses. Two periods weekly during the second term.

Special Lectures

It is the policy of the college to provide its students with the advantages of frequent lectures by specialists in the various departments of knowledge.

In endowing the Ichabod Spencer Professorship in Philosophy, Mrs. Katherine Spencer Leavitt set aside the sum of \$25,000 to establish a lectureship in memory of her father, the Reverend Ichabod Spencer, D.D., of the class of 1822, to be known as the Ichabod Spencer Lectureship in Psychology.

These lectures are given by distinguished scholars in this department, each year's course being published in book form.

Religious Life

Religious life among the students is cared for through the agency of the Union College Christian Association. This work is under the special care of a secretary who devotes his time to the religious interests of the students. Vesper services are held every Sunday afternoon throughout the year and eminent speakers are secured to conduct these services.

The Literary Societies

The Philomathean Society, founded in 1793, about two years prior to the founding of the college, and the Adelpic Society, founded in 1796, invite to membership all students specially interested in debating. The societies hold frequent meetings during the autumn and winter months for the discussion of current, social and political questions. A joint debate is held in December in competition for the Allison-Foote prizes (page 142).

Library

The library occupies Nott Memorial Hall. It contains forty thousand volumes, and includes the engineering and scientific library of the late Professor Gillespie, the collection of mathematical works made by the late John Patterson, of Albany; the library of the late Hon. Henry J. Cullen, of the class of 1860, and the library of ancient and classical languages and literatures of the late Professor Tayler Lewis. The income from a bequest

of five thousand dollars left by the late Lemon Thomson, Esq., of Albany, of the class of 1850, is devoted to the purchase of books on American subjects, especially history and political science. An alcove, known as the Thomson Alcove, is reserved for these books. By the will of the late Rev. Oscar Blakeslee Hitchcock, of the class of 1852, a bequest of upwards of thirty thousand dollars was left to the college for the purchase of books, manuscripts, etc. A most important accession is the Croes Engineering Library, the gift of Mr. Edgar Beach Van Winkle of the class of 1860. This section of the library is in the General Engineering Building for the use of the engineering department of the college. The library is classified according to the Dewey decimal system and a dictionary card catalogue, on the Dewey plan, is now being prepared.

One hundred and fifteen periodicals and the transactions of many learned societies are received.

Library Rules.

Hours: 8-1; 2-6; 7:30-9 from Monday to Friday. 8-1; 7:30-9 on Saturday.

The library will be closed on Sundays and legal holidays.

The library will be open during vacation at hours to be announced.

Loan of books: Reference, Cullen and valuable books are not to be loaned.

Reserved books may be loaned over night, i. e., from 9 p. m. to 8 a. m. There will be a fine of \$1.00 per day or part of a day for each reserved book overdue.

Periodicals are regarded as reference books.

All other books may be loaned, not more than two at a time, for a period of two weeks, and may be once renewed, unless called for. A fine of ten cents per day will be charged for all books overdue, and all library privileges will be withdrawn until the book is returned and the fine paid.

The Natural History Museum

PROFESSOR STOLLER, CURATOR

The Wheatley collection of minerals, presented to the college in 1858, by E. C. Delavan, Esq., contains 4,000 specimens, many

of which represent the more valuable forms. This collection has recently been carefully inspected by Dr. D. S. Martin of New York city. All of the specimens have been re-identified and the entire collection has been re-arranged and placed in order for exhibition and for study.

In geology there is a general collection of rocks and minerals, and a considerable collection of the paleozoic rocks and fossils of the New York formations.

In zoology the collection of mounted birds numbers 311 specimens, representing 161 species of the bird fauna of the eastern United States. These have recently been carefully inspected, and re-labelled. Fishes, amphibia and reptiles, especially of the local fauna, are represented by specimens in alcohol. In the department of invertebrates the collections of marine animals made by Dr. Harrison E. Webster are extensive, including sponges, corals, worms, crustacea and mollusks, the total number of species represented being over 5,000. The Wheatley collection of shells, presented by E. C. Delavan, Esq., consists of 8,000 specimens.

The botanical collections include a nearly complete set of local flowering plants, the work of Professor Jonathan Pearson. To this there has since been added a complete set of the ferns and fern allies of Schenectady county. The herbarium also includes a considerable number of foreign plants, including representative collections from Germany, Spain, Asia Minor and England, as well as some specimens from Iceland, Norway, France and Switzerland. They have been sorted and distributed in a single series following the latest accepted sequence, that of Engler and Prantl's *Natürliche Pflanzenfamilien*, making the entire collection of some 8,000 or 10,000 specimens readily accessible for reference and study.

The museum is open to the public on Wednesday afternoon and Saturday morning. Visitors may be admitted at other times by making application to the college librarian.

CURRICULA OF ACADEMIC COURSES

The numeral after a subject refers to the course as described in the departmental statement; the number in parenthesis refers to the page where the statement is given. The hours show the time given the subject each week in the class room.

Course leading to Degree of A.B.

Freshman Year

Greek 1.....	(42).....	4 hours
Latin 1.....	(44).....	4 hours
English 1.....	(52).....	3 hours
Mathematics 1, 2, 3.....	(62).....	4 hours
Physiology and Hygiene 1.....	(70).....	2 hours

Total 17 hours

In the second and third terms one credit hour is required in Gymnastics

Sophomore Year

Greek 3 and Ancient History.....	(42).....	4 hours
Latin 2.....	(44).....	3 hours
English 3.....	(53).....	3 hours
German 2.....	(47).....	5 hours
or		
French 2.....	(50).....	5 hours
Mathematics 4a.....	(62).....	3 hours
or		
Biology and Geology 2.....	(68).....	3 hours

Total 18 hours

Junior Year

Rhetoric 11.....	(55).....	1 hour
Electives.....	(80).....	15 hours

Total 16 hours

Senior Year

Rhetoric 12.....	(55).....	1 hour
Electives.....	(81).....	15 hours

Total 16 hours

Course leading to Degree of Ph.B.

Freshman Year

Latin 1.....	(44).....	4 hours
German 1b.....	(46).....	5 hours
or		
French 1b.....	(50).....	5 hours

English 1.....(52).....	3 hours
Mathematics 1, 2, 3.....(62).....	4 hours
Physiology and Hygiene 1....(70).....	2 hours

Total 18 hours

In the second and third terms one credit hour is required in Gymnastics

Sophomore Year

Latin 2.....(44).....	3 hours
German 2.....(47).....	5 hours
or,	
French 2.....(50).....	5 hours
English 3.....(53).....	3 hours
History 1.....(56).....	4 hours
Mathematics 4a.....(62).....	3 hours

or	
Biology and Geology 2.....(68).....	3 hours

Total 18 hours

Junior Year

Rhetoric 11.....(55).....	1 hour
Electives.....(80).....	15 hours

Total 16 hours

Senior Year

Rhetoric 12.....(55).....	1 hour
Electives.....(81).....	15 hours

Total 16 hours

Course leading to Degree of B.S.

Freshman Year

German 1b*.....(46).....	5 hours
or	
French 1b.....(50).....	5 hours
English 1.....(52).....	3 hours
Mathematics 2a, 3a, 4.....(62).....	5 hours
Chemistry 1a.....(66).....	3 hours
Physiology and Hygiene 1....(70).....	2 hours

Total 18 hours

In the second and third terms one credit hour is required in Gymnastics

* Students who offer Latin for entrance take Latin 1 in place of German or French.

Sophomore Year

German 2.....(47).....	5 hours
or	
French 2.....(50).....	5 hours
English 3.....(53).....	3 hours

History 1.....(56).....	4 hours
Mathematics 5.....(63).....	3 hours
Chemistry 2a.....(67).....	3 hours
or	
Biology 1.....(68).....	3 hours
<u>Total 18 hours</u>	

Junior Year

Rhetoric 11.....(55).....	1 hour
Electives.....(80).....	15 hours
<u>Total 16 hours</u>	

Students who offer Latin for entrance must elect German 3 or French 3.

Senior Year

Rhetoric 12.....(55).....	1 hour
Electives.....(81).....	15 hours
<u>Total 16 hours</u>	

The list of electives is given in full with the schedule time of each on pages 80-82. The general conditions governing the choice of electives are stated on page 80. The detailed outline of work in each subject and any restrictions limiting its election are given under the departmental statements on page 42-70.

Pre-Medical Course

Physics 1b.....(64).....	4 hours
Biology 5.....(69).....	4 hours
Chemistry 1a.....(66).....	4 hours
German 1b.....(46).....	5 hours
or	
French 1b.....(50).....	5 hours
<u>Total 17 hours</u>	

In the second and third terms one credit hour is required in gymnastics.

This course is offered to meet the requirements for admission to the Medical Department of Union University in accordance with recommendations of the American Medical Association.

SCHEDULE OF REQUIRED STUDIES IN THE ACADEMIC COURSES

Freshman Year

A. B. Course

Greek, 4 hours.....	T., W., F., S., 9-10
Latin, 4 hours.....	M., T., Th., S., 11-12
English, 3 hours.....	M., W., F., 8-9
Mathematics, 4 hours.....	M., W., Th., F., 1:30-2:30
Physiology and Hygiene, 2 hours.....	T., Th., 8-9

Ph. B. Course

Latin, 4 hours.....	M., T., Th., S., 11-12
German, 5 hours.....	M., T., W., F., S., 9-10
or	
French, 5 hours	M., T., W., F., S., 9-10
English, 3 hours.....	M., W., F., 8-9
Mathematics, 4 hours.....	M., W., Th., F., 1:30-2:30
Physiology and Hygiene, 2 hours.....	T., Th., 8-9

B. S. Course

German, 5 hours.....	M., T., W., F., S., 9-10
or	
French, 5 hours.....	M., T., W., F., S., 9-10
or	
Latin I, 4 hours.....	M., T., Th., S., 11-12
English, 3 hours	M., W., F., 8-9
Mathematics, 5 hours.....	M., W., Th., F., S., 11-12
Chemistry, 3 hours.....	T., Th., 10-11; F., 1:30-3:30
Physiology and Hygiene, 2 hours.....	T., Th., 8-9

Sophomore Year

A. B. Course

Greek, 4 hours.....	M., T., Th., S., 10-11
Latin, 3 hours.....	M., W., F., 9-10
English, 3 hours.....	T., Th., S., 8-9
German, 5 hours.....	T., W., Th., F., S., 11-12
or	
French, 5 hours.....	T., W., Th., F., S., 11-12
Mathematics, 3 hours.....	M., W., F., 8-9
or	
Biology and Geology, 3 hours.....	M., W., F., 8-9

Ph. B. Course

Latin, 3 hours.....	M., W., F., 9-10
---------------------	------------------

German, 5 hours.....	T., W., Th., F., S., 11-12
or	
French, 5 hours.....	T., W., Th., F., S., 11-12
English, 3 hours.....	T., Th., S., 8-9
History, 4 hours.....	M., T., Th., S., 10-11
Mathematics, 3 hours.....	M., W., F., 8-9
or	
Biology and Geology, 3 hours.....	M., W., F., 8-9

B. S. Course

German, 5 hours.....	T., W., Th., F., S., 11-12
or	
French, 5 hours.....	T., W., Th., F., S., 11-12
English, 3 hours.....	T., Th., S., 8-9
History, 4 hours.....	M., T., Th., S., 10-11
Mathematics, 3 hours.....	M., W., F., 9-10
Chemistry, 3 hours.....	M., W., 1:30-4:30
or	
Biology, 3 hours.....	M., W., 1:30-2:30 F., 1:30-3:30

Junior Year

All Courses

Rhetoric, 1 hour.....	F., 4:30-5:30
-----------------------	---------------

Students who enter the B.S. course on Latin must elect French 3 or German 3 in their junior year.

Senior Year

All Courses

Rhetoric, 1 hour.....	F., 3:30-4:30
-----------------------	---------------

For statement of work in each subject see pages 42-71

SCHEDULE OF JUNIOR AND SENIOR ELECTIVES

A total of fifteen hours is required.

Each student is required to choose two electives to be continued for two years, one of which must be the continuation of a subject previously pursued in college.

Any student in the Ph. B. course may take the A. B. degree if he elects Greek for five hours in the junior and senior years.

The head of a department may direct the choice of electives in other departments, for honor students, to the number of six hours in each year.

Subjects that conflict have been placed in the same group.

Junior Groups

For limiting conditions, see statements of respective departments.

Group I

German 3, 3 hours.....	M., W., F., 8-9
German 3a, 3 hours.....	M., W., F., 8-9
Greek 5, 3 hours.....	M., W., F., 8-9

Group II

Mineralogy, 3 hours.....	T., Th., S., 8-10
French 3, 3 hours.....	T., Th., S., 8-9
French 3a, 3 hours.....	T., Th., S., 8-9

Group III

Mathematics 5, 3 hours.....	M., W., F., 9-10
English 4, 3 hours.....	M., W., F., 9-10

Group IV

Latin, 3 hours.....	T., Th., S., 9-10
Mathematics 6, 3 hours.....	T., Th., S., 9-10
Mineralogy 7, 3 hours.....	T., Th., S., 8-10

Group V

Economics, 3 hours.....	M., W., F., 10-11
Greek 6, 5 hours.....	M., T., W., Th., F., 10-11
Mechanics and Physics, 3 hours.....	M., W., F., 10-11

Group VI

General Chemistry, 3 hours.....	T., Th., 10-11; F., 1:30-3:30
Argumentation, 3 hours.....	T., Th., S., 10-11
Greek 6, 5 hours.....	M., T., W., Th., F., 10-11

Group VII

European History, 3 hours.....	M., W., F., 11-12
English 6, 3 hours.....	M., W., F., 11-12

Group VIII

English 5, 3 hours.....	T., Th., S., 11-12
Logic, Psychology and Ethics, 3 hours.....	T., Th., S., 11-12

Group IX

Qualitative Analysis, 3 hours.....	M., W., 1:30-4:30
Laboratory Physics, 3 hours.....	M., 1:30-2:30; W., F., 1:30-3:30
General Chemistry, 3 hours.....	T., Th., 10-11; F., 1:30-3:30
Spanish, 3 hours.....	M., W., F., 1:30-2:30

Group X

Quantitative Analysis, 3 hours.....	T., Th., 1:30-4:30
-------------------------------------	--------------------

Senior Groups

For limiting conditions, see statements of respective departments.

Group I

American History, 3 hours.....	M., W., F., 8-9
French 4, 3 hours.....	M., W., F., 8-9
French 4a, 3 hours.....	M., W., F., 8-9

Group II

German 4a, 3 hours.....	T., Th., S., 8-9
German 4, 3 hours.....	T., Th., S., 8-9
Greek 7, 3 hours.....	T., Th., S., 8-9
Constitutional History, 3 hours.....	T., Th., S., 8-9

Group III

Economics, 3 hours.....	M., W., F., 9-10
Greek 9, 3 hours.....	M., W., F., 9-10

Group IV

Mathematics 6, 3 hours.....	T., Th., S., 9-10
English 7, 3 hours.....	T., Th., S., 9-10
Sociology, 3 hours.....	T., Th., S., 9-10

Group V

Latin, 3 hours.....	M., W., F., 10-11
Mathematics 7, 3 hours.....	M., W., F., 10-11

Group VI

Advanced Psychology (first term), 3 hours....	T., Th., S., 10-11
Advanced Ethics (second term), 3 hours.....	T., Th., S., 10-11
Evolution of Religion (third term), 3 hours....	T., Th., S., 10-11
Mathematics 8, 3 hours.....	T., Th., S., 10-11
Latin 6, 3 hours.....	T., Th., S., 10-11

Group VII

Physics 5, 3 hours.....	M., W., F., 11-12
English 8, 3 hours.....	M., W., F., 11-12
History of Philosophy, 3 hours.....	M., W., F., 11-12

Group VIII

Comparative Politics, 3 hours.....	T., Th., S., 11-12
Mathematical Physics, 3 hours.....	T., Th., S., 11-12
English 9, 3 hours.....	T., Th., S., 11-12

Group IX

Qualitative Analysis, 3 hours.....	M., W., 1:30-4:30
Organic Chemistry, 3 hours.....	M., W., 1:30-4:30
Laboratory Physics, 3 hours....	M., 1:30-2:30; W., F., 1:30-3:30
Greek 8, 5 hours.....	M., T., W., Th., F., 1:30-2:30
History of Education, 3 hours.....	M., W., F., 2:30-3:30
Spanish, 3 hours.....	M., W., F., 2:30-3:30

Group X

Quantitative Analysis, 3 hours.....	T., Th., 1:30-4:30
Animal Morphology, 3 hours.....	T., Th., 1:30-4:30
Greek 8, 5 hours.....	M., T., W., Th., F., 1:30-2:30
Advanced Argumentation, 2 hours.....	T., 2:30-4:30
Rhetoric and Public Speaking, 2 hours.....	Th., 2:30-4:30

For statement of work in each subject see pages 42-71

THE ENGINEERING SCHOOL

Historical. When Union College was chartered, in February, 1795, the only American colleges west of the Hudson River were William and Mary, Princeton, Hampden-Sidney, Rutgers and Dickinson. These, as well as the New England colleges, were all denominational; Union was the first strictly non-sectarian American college, and its name was inspired in part by this novel characteristic. The first full professorship in natural science in an American college was founded at Union and it is a matter of special scientific interest that Prof. F. R. Hassler was called from this chair in 1811 to establish the United States Coast Survey.

The engineering school of Union College is one of the oldest technical schools of the country. Founded in 1845 with Prof. William M. Gillespie at its head, it at once took high rank, and for many years was one of the few engineering schools in America. From the first it appears to have been the evident policy of the school to adapt the thorough training of *L'Ecole des Ponts et Chaussées*, of Paris, France, where Prof Gillespie had finished his technical education, to the demands of professional practice in a vigorous new country, where resources and opportunities were abundant, and where capital and professional precedent were wanting. From the characteristic tendencies impressed on the school at its foundation it has never departed, although it has endeavored to keep pace with the development in American technical education and with the increased demands on professional training. For many years civil engineering only was taught; then, as the principles of modern sanitary science came to be better understood and the possibilities of their further development and their utilization as life-saving agencies were discerned, a course in sanitary engineering was established; and more recently a course in electrical engineering was added.

During its whole history the school of engineering at Union has stood for broad, fundamental training rather than for narrow specialization and during recent years, since its advanced entrance requirements have made room in the course, increased time and attention have been given to culture studies and to a larger proportion of academic training.

Local Advantages. Schenectady is a peculiarly favorable location for an engineering school. The city is on the Mohawk River, and is intersected by several steam railroads, a number of inter-urban trolley lines and the Erie Canal, furnishing many bridges and other engineering works. At Schenectady are also located the works of the General Electric Company and of the American Locomotive Company, each an extensive and leading industry in its respective line. Among other interesting engineering features may be mentioned the city grade-crossings improvement completed at a cost of a million dollars, and the city water-works, which contain in their outfit a system of ground-water wells and a set of electrically-driven multiple-stage centrifugal pumps, of twenty million gallons daily capacity. The neighboring cities of Albany, Troy and Cohoes, as well as the surrounding territory, offers numerous examples of good engineering and many features of value as aids in engineering training. Among these may be mentioned the scientific departments of the state government at Albany, comprising the state engineer's department, which includes also the new barge canal, the good roads division and the bureau for testing materials; the headquarters of the state water supply commission, which includes also the state river improvement work; the headquarters of the Public Service Commission for district No. 2; the state library, which is well supplied with technical and engineering works; the Albany city water filtration plant; at Troy, the Burden iron works and the Gurley engineering instrument manufactory; at Watervliet, the United States arsenal and gun factory; the water power developments and electric power transmission plants at Mechanicville, Spier Falls, Schaghticoke and Johnsonville; the hydraulic cement works at Glens Falls and at Howe's Cave; and the modern sewage disposal systems at Saratoga Springs, Ballston Spa and Scotia. The new barge canal will pass the Cohoes falls by a flight of locks and will pass Schenectady by a system of locks and dams, both permanent and movable, now under construction, which will canalize the Mohawk River, calling for extensive and interesting engineering operations. All these sources of aid are utilized in the work of the school.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
Professor of History and Government

OLIN H. LANDRETH, A. M., C. E., Sc.D.
Professor of Civil Engineering

ERNST JULIUS BERG, M. E., PH. D.
Professor of Electrical Engineering

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electro-Physics

FRANK S. HOFFMAN, A. M., PH. D.
Ichabod Spencer Professor of Philosophy

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D., Sc.D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Professor of Modern Languages

HORACE GRANT MCKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. MCCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

CHARLES F. F. GARIS, PH. B., M. S.
Professor of Mathematics

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE J. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

MORTON COLLINS STEWART, PH. D.
Assistant Professor of German

STANLEY PERKINS CHASE, PH. D.
Assistant Professor of English

WALTER LYMAN UPSON, E. E., M. S., M. E. E.
Assistant Professor of Electrical Engineering

ROBERT TUDOR HILL, PH. D.
Assistant Professor of Economics

WARREN C. TAYLOR, S. B.
Assistant Professor of Civil Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

CHARLES G. ANTHONY, B. S.
Instructor in Engineering Mathematics

J. GEORGE STEINLE, C. E.
Instructor in Engineering

ALBERT JACOB SALATHE, A. M.
Instructor in Chemistry

GEORGE ELLAR WISEWELL, A. M.
Instructor in French

EVERETT S. LEE, B. S.
Instructor in Electrical Engineering

Ichabod Spencer Lecturer on Psychology

JOHN DEWEY, PH. D., LL.D.

COURSES OF STUDY

General Education and Technical Training. In the training of a young man for his professional work two distinct methods are open. One is to separate his professional work from his general educational training and to complete the latter before the former is commenced. This is the plan followed in the professional schools of theology, law and medicine. The other plan is, after the student has reached a certain point in his studies to have him carry forward at the same time his general education and his technical training. This plan is the one generally followed in engineering schools, as it has been found by engineering educators and professional engineers to yield better results in practice than the former plan. The point selected at which the technical training shall commence is the beginning of the college course, the time of which is divided between general studies and technical studies. In the Union College engineering courses the time allotted to these two divisions is about equal, though the two are carried on simultaneously, the general training being given, however, more time in the early part of the course and less in the latter part.

Undergraduate Courses. Three undergraduate courses of study in engineering are offered, extending through four years. (1) A four-year course in general engineering, which is intended to give the basis of a broad engineering education, including the fundamental principles underlying the special branches of the profession; (2) A four-year course in sanitary engineering which differs from the general engineering course by substituting special work in sanitary subjects for some of the general engineering studies; and (3) a four-year course in electrical engineering, in which the last two years are devoted to essentially mechanical and electrical engineering subjects.

These three courses are identical during the first two years, the sanitary course differing slightly from the general during the last year, while the electrical course in its last two years differs widely from the other courses. The degree of Bachelor of Engineering (B.E.) is given for the successful completion of any one of the above three courses.

Graduate Courses. In addition to the above undergraduate courses in engineering, the following graduate courses and degrees are offered:

The degrees of Master of Civil Engineering (M. C. E.) and of Master of Science in Electrical Engineering (M. S. in E. E.) are given on the satisfactory completion of one-year graduate courses of resident study in civil engineering and in electrical engineering, respectively. The degree of Doctor of Philosophy (Ph. D.) is given to candidates who have received the master's degree, on the completion of an additional course of two years of graduate study in electrical science.

The non-resident degree of Civil Engineer (C. E.) and Electrical Engineer (E. E.) may be conferred upon graduates of Union College under conditions explained on page 146.

STUDIES OF THE FOUR COURSES

The following is an outline of those studies which in general are common to the three four-year courses in general, sanitary, and electrical engineering and to the six-year general engineering and Latin-scientific course. The studies which are peculiar to each are outlined under the separate departments.

Following the distinction between the two kinds of training above mentioned, the studies here outlined are arranged under the two heads of general studies and technical studies.

General Studies

Physics. The instruction in physics comprises a series of lectures on experimental physics, accompanied by classroom and laboratory work. Physical laboratory work is required of all engineering students.

See pages 63-65 for detailed statement.

Chemistry. General chemistry is taught by lectures, recitations and laboratory work during the freshman and sophomore years and laboratory work in qualitative analysis is continued through the first term of the junior year. Sanitary engineering students, in addition to the above, take chemical laboratory work during

the first and second terms of the senior year and work in sanitary analysis during third term.

See pages 66-68 for detailed statement.

Astronomy. The instruction in astronomy includes physical astronomy, spherical trigonometry and the theory of astronomical instruments. These studies are preparatory to the work in astronomical surveying and geodesy given in the general engineering course. In the electrical engineering course the work is confined to descriptive astronomy.

See pages 63-65 for detailed statement.

Biology. Physiology is a required study in each of the three engineering courses. Structural botany is given in the general and sanitary courses, and bacteriology is given in the sanitary course. Structural botany includes the microscopic study of the vegetable cell, the tissues and the tissue-system of the higher plants with special reference to the use of woods in the constructive arts. In bacteriology some of the common bacteria of water, air and soil are studied according to the methods of modern bacteriological work. The accompanying lectures treat of bacteria in regard to their place and role in nature and their relations to sanitary science.

See pages 68-70 for detailed statement.

Geology. (Not required in the electrical engineering course). This work comprises a course in economic geology, which includes the general principles of geology and a discussion of the occurrence and distribution of minerals and mineral materials for construction in the United States.

See pages 68-70 for detailed statement.

English. The instruction in English aims at a general acquaintance with English literature and a correct, clear and forcible use of the language. Rhetoric is studied throughout the freshman year. In the first term a summary review of diction is given. In the second and third terms more attention is given to the development of thought by work upon kinds of composition and the paragraph. In the sophomore year English literature as represented by the work of the essayists and by Shakespeare is

studied. In the senior year one of the required essays of each term will be upon a technical subject prepared under the direction of the professor of civil engineering, the object being to give the engineering student practice in the preparation of clear, concise and systematic reports on engineering subjects.

See pages 52-56 for detailed statement.

Modern Languages. All engineering students at the time of entrance must have had two years of either French or German. After entering they are required to pursue French and German each for one year. This will be advanced work for the language offered at entrance, and elementary work in the language not offered. Some work in scientific French and scientific German is done during the latter part of the course.

See pages 45-52 for detailed statement.

History and Economics. American history throughout the junior year and economics during the first term of the senior year are required of all engineering students.

See pages 56-57 for detailed statement.

Economics, Political Science and International Law. General engineering students who elect Option B in engineering administration are required to have economics during the three terms of the senior year, political science during the first two terms, and international law during the last term.

See pages 60-61 for detailed statement.

Physiology and Physical Training.

See pages 70-71 for detailed statement.

Voluntary Studies. Any of the studies of the classical course or of the scientific course of the college may be taken by engineering students without extra charge, on approval of the faculty.

Mathematical and Technical Studies

The following mathematical and technical subjects are included in each of the three engineering courses, and the instruction therein is given in the general engineering department.

Mathematics

To the engineer the subject of mathematics is essential not only for its disciplinary training, but also for its practical applications and use. Both these features receive due consideration in the teaching of the subjects under this head, especial effort being made to incite the student to independent thinking, and to enable him to apply his knowledge of mathematics to his technical work, at the same time holding him to rigorous methods and logical conclusions.

G.E.1. Freshman Mathematics. This course includes the following subjects.

Required of all engineering freshmen. 5 hours weekly throughout the year.

Algebra, a course in advanced algebra including the graphical treatment of imaginaries and determinants, extending through four-fifths of the first term.

Trigonometry, a course beginning at the close of the work in algebra and treated of plane trigonometry, both elementary and advanced.

Analytical Geometry, a course in plane and solid analytical geometry, including an investigation of the more important higher plane curves and extending through about four-fifths of the spring term.

Differential Calculus, a course aiming to acquaint the student with the principles of deriving the formulas for derivatives of algebraic and transcendental functions.

G.E.2. Sophomore Mathematics. This course continues the freshman mathematics and devotes the entire year to the subject of differential and integral calculus. The course provides drill in the fundamentals of integration; the application of derivatives to curves; maxima and minima; the development of series; problems involving rates, curvature, surfaces and volumes; and the application of calculus to problems in mechanics.

Required of engineering sophomores. Three hours weekly during the year.

G.E.6. Analytical Mechanics. The subjects taught under this head are statics, dynamics, hydro-statics, hydro-dynamics, and pneumatics. These studies form the foundation for applied mechanics, strength of materials and stresses in framed structures, all of which are fundamental to engineering designing.

Required of all engineering sophomores. Three hours weekly during first term and two hours weekly during the second and third terms.

Drawing and Descriptive Geometry

The following courses are required:

G.E.11. Freehand Drawing. This course includes the study of form, proportion, and perspective; light and shade; the æsthetics of decorative and applied design; drawing from models; and engineering lettering.

Required of all engineering freshmen. One lecture and two drawing periods weekly during the first term.

G.E.12. Mechanical Drawing. This course takes up the study of projections of solids in the four quadrants; the development of working drawings; isometric and oblique projections; care and use of drawing instruments; mechanical lettering; and blue printing. Architectural and engineering subjects are treated in the working drawings.

Required of all engineering freshmen. One lecture and two drawing periods weekly during the second term.

G.E.13. Descriptive Geometry. This course is a continuation of G.E.12. Original problems relating to the stationary and revolved positions of points, lines and planes are given in addition to the study of the first seventeen problems of Church's Descriptive Geometry. The application of the subject to practical problems is emphasized.

Required of all engineering sophomores. One recitation and two drawing periods weekly during the second term.

G.E.14. Descriptive Geometry (continued). This course is a continuation of G.E.13. Study is made of problems relating to tangent planes; intersections and developments of plane and

curved surfaces; shades and shadows and linear perspective. Practical application to various architectural and engineering details are considered. Use is made of the Schroeder models, the Olivier models and the models of intersection of the Paris polytechnic school.

Required of all engineering sophomores. One recitation and two drawing periods weekly during the third term.

Surveying

The following courses are given:

G.E.21. Mensuration. A thorough study is made of pure and applied mensuration of lines, planes and solids, making a valuable preparation for the work in surveying.

Required of all engineering freshmen. Two hours weekly during the second term.

G.E.22. Surveying and Plotting. A careful study is made of surveying instruments, treating their geometrical, optical and mechanical relations; their adjustments and use; and the determination of their instrumental constants, errors and limits of precision. In field work the classes are divided into small sections and directed by the instructors. Office computations, plotting and mapping are made adjuncts of the field survey.

Required of all engineering freshmen. One recitation and one field or drawing period weekly during the third term.

G.E.23. Plane Surveying. This course is a continuation of G.E.22, and consists of a study of the methods of plane surveying. Field work is conducted along thoroughly practical lines and a complete traverse, with its details, is worked out by each student, together with other important problems.

Required of all engineering sophomores. One recitation and one field drawing period weekly during the first term.

G.E.61. Engineering Lectures. Lectures are given on topics pertaining to the training and qualifications of an engineer and to the engineering profession. Students are assigned parallel readings bearing on these topics.

Required of all engineering freshmen and sophomores. One hour weekly during the first and second terms of the freshman year and the third term of sophomore year.

G.E.62. Summer Vacation Work. All students in the Engineering courses during their summer vacation following the freshman, sophomore and junior years are required to prepare a report on their summer work. This report must be done under one of the following options:

1. Actual participation in engineering work.
2. Investigation by research and reading.
3. Critical examination of some engineering project.
4. Critical reading and abstract of a stated amount from an approved list of books. The details of these options are announced by the department.

The work is due at the opening of the fall term.

G.E.63. Commencement Term Work. In addition to the weekly field and laboratory exercises throughout the year, all freshman and sophomore engineering students, and juniors in the general engineering course, are given an uninterrupted fifteen days' course in field-practice and laboratory work supplementary to the studies in which such practice is desirable. The course begins on the day (Thursday) following Commencement and continues through that and the two following weeks. The work is so selected and arranged as not only to supplement the studies of the year, but also to give instruction and practice in the organization, operation and direction of work conducted by engineering parties. This work receives three hours' credit in the fall term grades.

Thesis. Each candidate for graduation is required to present on or before the third Wednesday in May of his graduation year a satisfactory thesis on a subject that has been approved by the professors of civil engineering or of electrical engineering. This thesis must be original in its character and may be either a design for some engineering structure or plant, process or operation, or an independent investigation of some principle, problem or matter of engineering importance. Re-

views or copies of existing structures, plants or processes, unless of special educational value or involving original investigation, will not be approved as subjects. This thesis is to be in a form prescribed at the time of approval of the subject, and is to be bound for deposit in the library of the engineering school, and must be presented in this shape on or before the stipulated date. The subjects, with outlines of the proposed treatment, must be submitted in time for final approval not later than November 1st preceding graduation, and the work on the theses must be presented for inspection and criticism of the professor in charge of the department at intervals during progress

GENERAL ENGINEERING DEPARTMENT

Two Optional Courses. In the four-year general engineering courses two optional courses are offered, either of which may be selected by general engineering students at the beginning of the junior year, and each of which extends through the junior and senior years.

The first of these courses, designated as Option A, offers a broad, fundamental, general engineering training such as a thoroughly trained engineer should have before specializing in any of the branches of the profession.

The other course, designated as Option B, while in the main identical with the former, differs from it by omitting some of the more technical subjects, such as stereotomy, kinematics, least squares, sewerage, geodesy and field astronomy, and by substituting therefor, sociology, the elements of law, political science and international law, the principles of finance and financial operations, the principles of business management and accounting, and additional work in history and in engineering law and procedure. The object of this course is to offer to engineering students an opportunity better to qualify themselves for engineering positions of an executive or administrative character. These two options are also offered in the six-years general engineering course and extend through the fifth and sixth years.

The details of these two optional courses will be found on pages 122, 123, 125, 126.

In addition to the studies common to all engineering courses

previously described on pages 88-95, the following subjects are included in the general engineering course:

Mathematics (continued)

These subjects are required:

G.E.7. Engineering Mathematics. This course gives a review of the algebra, trigonometry, analytical geometry, calculus, and analytical mechanics, required of general engineers during the first three years, showing the logical connection of the several subjects and their application to engineering problems.

Required of all engineering seniors. Two hours weekly during the first and second terms.

G.E.8. Least Squares. This course treats of the fundamental principles and processes of the method of least squares, and their application to the solution of astronomical, physical and engineering problems.

Required of general engineering seniors in Option A. Two hours weekly during the second term.

G.E.9. Spherical Trigonometry and Astronomy. A short course in descriptive and mathematical astronomy with some preliminary work in spherical trigonometry is given by the Department of Physics.

Required of general engineering juniors in Option A. Three hours weekly during the third term.

Drawing and Descriptive Geometry (continued)

The following subjects are required of general engineers:

G.E.16. Stereotomy. This course comprises an extension and application of the principles and methods of descriptive geometry to the study and design of the various forms of solids, and to the preparation of the necessary patterns, templates, forms, etc., required in construction.

Required of general engineering juniors in Option A. Two periods weekly during the second term.

G.E.17. Machine Drawing. This work supplements the classroom work in kinematics. A study is made of the representation

of machine motions and their analyses, including gears and their motions.

Required of general engineering juniors. One drawing period weekly during the second term.

Surveying (continued)

The following courses are required.

G.E.24. Topographical Surveying. The class room work considers various kinds of surveying, including land, city, mining, and hydrographic surveying. Field practice in topographical methods, stadia traversing, and triangulation supplements the recitation work. A map is plotted during the term.

Required of general engineering juniors. Two recitations and one field drawing period weekly during the first term.

G.E.25. Route Surveying. A rigorous study is made of the elements of railroad reconnaissance and location, including the details of railroad curves and turnouts. A considerable portion of the time is spent in field problems and in the practical methods employed in office computations.

Required of general engineering juniors. Two recitations and one field period weekly, during the third term.

G.E.26. Geodesy and Field Astronomy. After a study of the fundamental principles of the adjustment of errors and their use in establishing empirical formulas, a discussion of the figure of the earth, triangulation, base lines, and precise leveling is taken up. This study is accompanied by field work, which includes the determination of time, latitude, and azimuth, with ordinary instruments and with observatory methods and instruments.

Required of general engineering seniors in Option A. Two recitations and one field period weekly during the third term.

Engineering Design and Construction

The following courses are required:

G.E.31. Applied Mechanics. This course comprises the extension of analytical mechanics and the development of the methods of graphical analysis with their applications to engineering problems, operations and constructions, particularly the treatment of

stresses, strains, deflections and deformations in elastic materials and structures due to extraneous forces.

Required of general engineering juniors. Four hours weekly during the first term.

G.E.32. Mechanics of Materials. This course is an application of portions of G.E.31 to mechanics of materials. In conjunction with this work is given the study of the production, preparation, strength and physical properties of the various engineering materials, including timber, stones, cement and lime mortar, cast iron, wrought iron and structural steel.

Required of general engineering juniors. Three hours weekly during the second term.

G.E.39. Engineering Laboratory. This course includes the testing of structural materials in the mechanical and cement laboratories. Work is carried on supplementary to Mechanics of Materials, G.E.32.

Required of general engineering juniors. Two hours weekly during the second term.

G.E.33. Stresses.

Required of general engineering juniors. Four hours weekly during the third term.

G.E.34. Engineering Stresses.

Required of general engineering seniors. Four hours weekly during the first term.

G.E.35. Engineering Design.

Required of general engineering seniors. Four hours weekly during the second and third terms.

The courses in applied mechanics and materials and engineering stresses prepare the student to undertake the study of engineering design proper, which is pursued throughout the senior year; an important feature of this course is the work in bridges, railroads and water-power development, architectural engineering, etc. The exercises in this line of work are, as far as possible, chosen from professional practice, and the student is expected to carry out, from assigned data and conditions, the preliminary

study, determinations of stresses, types, dimensions and details, and to turn in the results in the form of working drawings, diagrams and memoirs. The course is preceded by a series of lectures on the principles and economics of designing. The department possesses a large collection of drawings and photographs of representative engineering structures from which students can form correct ideas of modern practice in the designing of details and in the methods followed on works of this class. The course in senior engineering design is also supplemented by actual design in the drafting room.

G.E.36. Building Construction. This is a recitation and lecture course on the principles and practice of building construction, including a thorough discussion of the proportions and properties of concrete as applied to construction work.

Required of general engineering seniors. Two hours weekly during the second term.

G.E.40. Reinforced Concrete. This is a short course treating the principles of reinforced concrete with their application to construction work. G.E.36 is a prerequisite to this course.

Required of general engineering seniors, Options A and B. One hour weekly during the third term.

G.E.37. Railroad Construction. In this course, which is a continuation of the course in junior route surveying (G.E.25), a complete investigation is made of railroad equipment; location and construction; maintenance of way; buildings and yards. A railroad route with its terminal is made in the field and the plans and estimate are computed in the drafting room.

Required of general engineering seniors in Option A. Three recitations and two field or office periods weekly during the first term.

G.E.38. Highways and Pavements. The course in highways comprises a consideration of the highway as an element in the transportation system of the state and of the principles of its economic location and proper construction, with a study of modes of construction, materials, maintenance, and systems of highway laws and administration.

There is also a study of the methods of laying out and grading streets and pavements and of the various street accessories, paving methods and materials and their treatment, with special reference to their economic and sanitary aspects.

Required of general engineering juniors. Four hours weekly during the first term.

Engineering Law and Procedure

These courses are given:

G.E.41. Engineering Law and Procedure. This course includes a treatment of the fundamental development of law from the Roman and English Common Law, the function of the state in general, and the American system of federal and state jurisdiction in particular. Some attention is given to the fundamental bases of the law of contracts, agency, property rights and corporations; and to the principles of finance and financial operations.

G.E.42. Elements of Law.

Required of general engineering juniors in Option B. Three hours weekly during the second term.

G.E.43. Law of Property and Contract.

Required of general engineering juniors in Option B. Three hours weekly during the third term.

G.E.44. Principles of Law of Corporations.

Required of general engineering seniors in Option B. Three hours weekly during the first term.

This course includes a treatment of the fundamental development of law, the function of the state in general and the American system of federal and state jurisdiction in particular. Attention is given to the fundamental bases of laws, contracts, agency, property rights, and corporation and municipal laws. The subjects are treated more extensively than in Option A (G.E.41).

Principles of Finance, Business, Accounting

These courses are offered:

G.E.46. Principles of Finance.

Required of general engineering seniors in Option B. Two hours weekly during the second term.

G.E.47. Principles of Administration.

Required of general engineering seniors in Option B. Three hours weekly during the third term.

G.E.48. Principles of Accounting.

Required of general engineering seniors in Option B. Three hours weekly during the third term.

General engineering students who elect Option B are given instruction in the principles of finance and financial operations, the principles of business and of industrial organization, and the principles of accounting and of cost-keeping.

G.E.51. Hydraulics. This course is a study of the fundamentals of hydraulics and hydraulic measurement, with the development of the theory and practice involved.

Required of general engineering juniors. Three hours weekly during the second term.

G.E.52. Water Supply Engineering.

Required of general engineering seniors in Option A. Three hours weekly during the second term.

G.E.53. Water Supply, Sewerage and Sewage Disposal.

Required of general engineering seniors in Option A. Five hours weekly during the third term.

The course in hydraulics is followed by a fuller development of the subject as applied to rain-fall, run-off and storage of water, in relation both to water power and to potable water supplies. This course is accompanied by a study of the sanitary aspects of the subject of water supply and its preservation from contamination. An outline study is also made of pumping engines. The new laboratory affords opportunity for experimental work on flow of waters through orifices and pipes, and for tests of pumps, etc.

G.E.56. Kinematics. This course treats of the fundamentals of

machine design and analysis of motion. Class room work is supplemented by machine drawing (G.E.17).

Required of general engineering juniors in Option A. Three hours weekly during the second term.

G.E.57. Thermodynamics. This course consists of lecture, recitation and exercise work in the principles of thermodynamics, the elements of the steam engine, valve diagrams and steam indicators.

Required of general engineering juniors. Two hours weekly during the second term.

G.E.58. Motors and Motive Power. Following the work in thermodynamics and hydraulics of the second term of the junior year an outline course in motors and motive power is given in the third term of the junior year and the first term of the senior year, comprising a study of the sources of demand and supply of power, steam-boilers, steam-engines, steam turbines, water-wheels and turbines, gas-engines, electric motors and transmission of power by shafting, belting, rope-driving, compressed air and electricity. The new laboratory affords opportunity for efficiency tests of hydraulic and other forms of motors.

Required of general engineering students. Three hours weekly during the third term of junior year and two hours weekly during the first term of senior year.

G.E.59. Electrical Machinery. A three-hour course in the fundamental principles and practice of electrical generators, motors, transformers, transmission and instruments as given by the Electrical Engineering Department.

Required of general engineering seniors. Three hours weekly during the second term.

G.E.64. Outlines of Architecture. This course is a study of the historical development of architecture as exemplified in the different orders and styles.

Required of general engineering seniors. Two hours weekly during the third term.

Equipment

General Engineering Building

The new engineering building, the donation of Mr. Andrew Carnegie for the general engineering department, erected at a cost of \$100,000, is a handsome structure of modern design, built of gray and buff pressed brick with gray stone trimmings.

The building is of fireproof construction throughout, the only wood used being in the doors, windows, and floor surface. It covers an area of 67 x 137 ft. and is three stories in height, with a basement above the ground level, making it practically four stories.

The entire east end of the basement, 50 x 62 ft. in area, is used as a hydraulic laboratory. It is equipped with a steel tank 5 ft. in diameter and 52 ft. high, extending to the roof, with a tight cover so that it can be used as either a gravity or a pressure tank. The base of the tank is provided with connections for standard orifices of various sizes and shapes. Connections will also be provided so that turbines and other forms of water motors can be driven by water from the tank under different heads. This room also contains a concrete canal 5 ft. deep, 9 ft. wide and about 20 ft. long, which will be extended out of doors to a total length of 100 ft. It will be arranged for the insertion of temporary dams at different points along its length, so that weirs may be used for the measurement of large flows of water. It is also to be used as a large measuring tank in connection with pump tests, and for various other hydraulic experimental purposes.

In the southwest corner of the basement is the cement laboratory, 46 x 26 ft. in area, equipped for the testing of cement, concrete, and similar structural materials. The northwest corner of the basement is taken up by a room for surveying instruments, with lockers, etc., for issuing equipment to field parties.

In the northeast corner is a large laboratory equipped with applied mechanical apparatus; the southeast corner is an engineering museum, where models of bridges and other engineering structures are placed, so as to be accessible for inspection.

The museum is connected by sliding doors with the engineering library and reading room. Here is placed the valuable Croes library, recently donated by E. B. Van Winkle, of the class of 1860, and also the large collection of engineering drawings, etc., belonging to the department.

The first floor also contains two recitation rooms, and one drawing room for the use of the class in engineering design.

On the second floor the north half is taken up by two large lecture or society rooms, each of which can be divided by folding partitions into two recitation rooms of the usual size. The south half of this floor is taken up by a computing room and building construction museum and one large and one small recitation room. In the southeast corner is the sanitary engineering laboratory.

On the third floor are two large drawing rooms, each about 24 x 60 ft., and three smaller drawing rooms. All of these rooms are well lighted by windows and skylights. On this floor is also a good-sized blue-print room, a photographic room, and a dark room.

Each floor contains two or more small private offices for the use of instructors; and the entire plan of the building is admirably adapted to the needs of the department.

Instruments and Apparatus

The department is supplied with field instruments of the best description, comprising a large theodolite, suitable for refined geodetic operations, transits, surveyors' compasses, prismatic compasses, Burnier's compass, solar compass, Y levels, plane tables, sextants, mountain barometers, aneroid barometer and a marine chronometer.

The extensive private collection of models and instruments belonging to the late Professor Gillespie was purchased for the engineering school.

The collection of models in descriptive geometry and stereotomy is very complete. The following are some of the most important:

The Olivier Collection. This consists of about fifty models,

representing the most important and complicated ruled surfaces of descriptive geometry, particularly warped or twisted surfaces. Their directrices are represented by brass bars, straight or curved, to which are attached silk threads representing the elements or successive positions of the generatrices of the surfaces. Each of these threads has a weight suspended by it, so as always to make it a straight line. These weights are contained in boxes sustaining the directrices and their standards. The bars are movable in various directions, carrying with them the threads, still stretched straight by the weights in every position they may take; so that the forms and natures of the surface which they constitute are continually changing, while they always remain ruled surfaces. In this way a plane is transformed into a paraboloid, a cylinder into a hyperboloid, etc.

These models were invented by the late Theodore Olivier while professor of descriptive geometry at the Conservatoire des Arts et Métiers, in Paris. One set of them is now deposited there, and a second is in the Conservatory at Madrid. Copies of some of them are to be found in most of the polytechnic schools of Germany. The Union College set is the original collection of the inventor, having been made in part by his own hands, and, after his death, in 1853, retained by his widow till bought of her by Professor Gillespie, in 1855. It is more complete than that in the Paris Conservatoire. It may be worth noticing that the silver plates on the boxes, reading "*Inventé par Théodore Olivier*," etc., were added by Madame Olivier, at her own expense, after the purchase, as a tribute to the memory of her husband, her own words being, "*Je tenais à ce que chaque instrument portât le nom du savant dont la réputation passera à la postérité.*"

Bardin's Models (Paris), in plaster, (seventy), of the intersections of prisms, pyramids, cones, etc.

Schroeder's Models (Darmstadt) of elementary descriptive geometry (twenty). The planes of projection are in wood, and the lines and surfaces in metal; models illustrating shades and shadows.

Stone Cutting Models (twenty), in plaster, selected from those of L'Ecole Polytechnique of Paris.

Professor Bardin's models (ten) in plaster, of oblique arches.

Groined and cloistered arch models (ten) in wood and plaster.

Models of structures in stone, consisting of bridges, culverts, etc.

Winding-stair models in wood and plaster. Full sized models of voussoirs and skew-backs of an oblique arch.

Models in Topography. French and German plaster models, giving all the different forms of ground, accompanied by topographical drawings, showing how to represent these forms by contour lines; hatchings and shades from vertical and oblique light; models and maps in colored topography; a large model of Mount Cenis pass, showing the wagon road and contour lines.

Architectural Models. Models of the five orders of architecture from L'Ecole des Beaux Arts, Paris; portals; stairs; roofs; walls; buttresses; domes, etc.

Engineering Models. Schroeder's models of joints, brick bonds, etc.; spur wheels; bevel wheels; cranes; pile drivers; various forms of water-wheels; pumps; cylinders; valves; eccentrics; etc.; steam engines.

Casts of St. Venant's models showing the changes of form in bodies subjected to flexure. Full sized model of the liquid vein measured by Poncelet and Lesbros.

Models of bridges of various systems, comprising truss, suspension, tubular and arch bridges; Doyne's dynamometer bridge models showing, by means of dynamometer, strains at different points; models of roof trusses, arranged for using the dynamometer to show the different stresses.

Models of fortifications, illustrating Vauban's system; shot, shell, etc.

Models of culverts, piers, abutments, culvert heads, wing walls, rail sections, etc.

Maps, Drawings, Etc. This collection embraces a large number of maps, plates, profiles, topographical drawings and spherical projections; about fifty thousand engravings, lithographs, photographs and detail drawings of engineering and architectural structures; working drawings of machines, bridges, buildings, etc.

Physical Apparatus. To illustrate the lectures in physics, the college has an extensive collection of apparatus. This has been secured largely from foreign makers and includes special pieces of apparatus constructed under the direction of the late Professor Foster, besides sets of apparatus of standard patterns by Koenig, Duboscq, Ruhmkorff, and others.

In Mineralogy. The Wheatley collection contains nearly 4,000 specimens of minerals, the result of the labors of Charles M. Wheatley. All of these have been labeled according to the nomenclature and order adopted by Dana. They are without exception, open at all times to the students. They furnish an admirable means of practical illustration in mineralogy. Among the rare and valuable specimens are those of anglesite, cerusite, mimetite and calcuprite, which in American specimens are equaled only by those in the British Museum. There are many fine specimens representing the noble metals from all parts of the world. There are few known species of minerals of which the collection does not contain some specimens.

In addition to this there is a large series of unlabeled specimens for crystallographic and blow-pipe examination.

In Metallurgy. The college possesses a suite of ores of the useful metals, comprising over 1,000 specimens. These have been arranged to illustrate their mode of occurrence and geographical distribution. In addition are the fluxes, fuels, etc., used in obtaining the metals from the ores, together with the slags and metals themselves in various forms. There is a large number of models and drawings of stacks, furnaces, etc.: also suites of specimens of wood, charcoal, mineral coal, peat, etc., for physical inspection; also specimens of most of the useful alloys.

In Chemistry. The chemical laboratory is furnished with tile-top desks and lockers, and all the modern apparatus necessary for work in general chemistry and qualitative and quantitative analysis. Ample hoods occupy one side of the laboratory, where the student may work with the disagreeable and poisonous gases. In the private laboratory of the professor of chemistry provision

is made for any students who may desire to pursue advanced courses, either in volumetric analysis, water and milk analysis, organic chemistry, or any special work in connection with courses of other departments.

A large number of specimens of the materials used in the manufacture of the mineral and some of the organic acids; the crude products themselves and the materials used in the manufacture of the alkalis, soaps, matches, black lead, candles, petroleum products; linseed, olive, castor, cottonseed and other oils; paper, porcelain, glass, fire and building brick, mortar and cements, beet and cane sugar, white lead and other paints, etc., etc., form a part of the permanent collection of the department.

SANITARY ENGINEERING DEPARTMENT

General Considerations. The extensive development of sanitary biology during recent years and the establishment on a firm, scientific basis of the germ-theory of disease have laid a secure foundation for the important specialty of sanitary engineering. Already the practical application of the principles in many lines of public utility, as well as in medicine and surgery, has resulted in a very marked decrease in the annual death rate. The most fruitful line of application of this recent and useful knowledge lies in the intelligent design, construction and operation of municipal public works and of systems of water supply, sewerage, and drainage, heating and ventilation of private residences, schools, hotels, hospitals and other public institutions and buildings.

General Scheme of the Course. The course in sanitary engineering is the same as Option A of the general engineering course for the first three years. During the fourth year the course differs from the general engineering course by omitting astronomical surveying, geodesy and railroad construction, and substituting therefor sanitary biology, heating and ventilation, house drainage and plumbing, sanitary codes and laws, and an increase in the amount of chemistry and chemical laboratory work.

Sewerage and Drainage. The study of the principles and practice of sewerage and sewage disposals is given during the last term of the senior year. The fundamental sanitary and construc-

tive principles are developed and a comparative study of the various systems as well as of the details of construction and maintenance receives careful attention. (See G.E.53.)

G.E.54. Sanitation. This course treats of the sanitary conditions of buildings including drainage and plumbing and also discusses sanitary codes and laws.

Required of sanitary engineering seniors. Two hours weekly during the third term.

G.E.55. Sanitary Analysis. This is a laboratory course given by the Department of Chemistry in the analyses of air, gases, water and sewage.

Required of sanitary engineering seniors. Four periods weekly during the third term.

G.E.60. Heating and Ventilation. This course treats the principles of heating and ventilation with a discussion of the various systems in use. Actual designing problems are made an important part of the work.

Required of sanitary engineering seniors. Three hours weekly during the first year.

Graduate Course

The general engineering department offers the following graduate course in residence:

The Degree of M. C. E. This course of one year's resident graduate study, consisting of lectures, laboratory and research work, is open to graduates of the general or the sanitary engineering course of Union College or of any other institution of a standing recognized by the faculty. On its successful completion the degree of Master of Civil Engineering is conferred.

Admission

The entrance requirements for the undergraduate course are given in detail on pages 30-40. Correspondence regarding admission to these courses should be addressed to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* Correspondence

regarding admission to the graduate course in civil engineering may be addressed to

DR. OLIN H. LANDRETH

Professor of Civil Engineering

Schenectady, New York

ELECTRICAL ENGINEERING DEPARTMENT

Purpose and Methods. A course of instruction in electrical engineering was introduced in 1895, and in 1902 was re-organized and made into a separate department of the engineering school under the direction of Professor Charles P. Steinmetz, consulting engineer of the General Electric Company. In 1913 Dr. Steinmetz resigned as head of the department to become Professor of Electro-Physics, and Dr. Ernst J. Berg was appointed Professor of Electrical Engineering in charge of the department.

The course of studies offered by the department of electrical engineering aims at a thorough and broad scientific education of the prospective engineer, rather than the specific training of a specialist. The instruction, therefore, consists of three classes of studies. The general culture studies furnish such training as is now considered essential for every educated man, as languages, literature, history, etc. Such instruction extends over a large part of the first two years, and is then followed by a broad and general technical education, giving the student the fundamental principles and their application to all branches of engineering. Ultimately follows the specific instruction in electrical engineering, which, while it enables the student, after graduation, to enter the field of electrical engineering practice in the manufacturing or operating company or consulting engineer's office in a subordinate capacity only, has given him all the necessary requirements to gather in a few years' practice the knowledge needed for independent work of greater magnitude.

The instruction especially aims at a thorough understanding of the fundamental principles rather than a memorizing of numerous facts — that is, aims at quality, and not quantity — and as far as possible in all engineering instruction the subject is brought before the student in three different ways; by a theoretical lecture

course with recitations, practical instruction in the electrical laboratory paralleling the lecture course, and, following this, the application of the knowledge gained in lecture courses and laboratory to calculation and design. Finally, more independent work on the solution of engineering problems is undertaken by the students. These problems invariably require some research work; the systematic tabulation of the results with original conclusions constitutes the graduating theses. Throughout the technical course, by work in the laboratory, some familiarity with the apparatus is given to the students before the technical side is taken up in the lecture course, so that when approaching the theoretical studies of electrical phenomena or apparatus the student is already able to appreciate the practical value and importance of the subject with which the theoretical investigations deal.

Through the active interest which the General Electric Company takes in technical education, an arrangement has been effected between the college authorities and the officials of the company by which the students in the junior and senior classes are admitted to the company's works at appointed times, under the direction of their instructor, with the privilege and opportunity of studying and inspecting the plant and operations and of being regularly instructed therein. The work has been systematically arranged, and is given simultaneously with the corresponding class and laboratory work, to which it forms an important and valuable adjunct.

List of Studies

In the following list of studies, only those subjects of the electrical engineering course which are not required in the other courses are described in detail. All the culture studies and most of the general engineering and scientific studies are pursued in common with the students of other engineering branches. Beginning with the junior year, however, the courses diverge. The electrical engineers take up a number of mechanical engineering subjects and continue them throughout the junior and first part of the senior year.

Studies also required in other courses are:

American History	Page	57
Rhetoric.	Page	55
Economics.	Page	60

In addition to the required studies two of the following subjects are taken as electives in the junior and senior years:

1. Comparative Politics	Page	57
2. Differential Equations	Page	63
3. Economics.	Page	60
4. French.	Page	49
5. German.	Page	46
6. Logic, Psychology and Ethics.....	Page	58
7. Mathematical Physics	Page	65
8. Qualitative Analysis	Page	67

The mechanical engineering subjects not previously described are:

M.E.1. Applied Mechanics. The application of the principles of theoretical mechanics are studied with particular reference to the changes in the size and shape of bodies. The consideration of stresses and deformations in bodies; the theory of the various types of beams, columns, shafts; and the elastic properties of materials, etc., are taken up in detail.

Required of electrical engineering juniors. Three hours weekly during the first term.

M.E.2 and 3. Heat Engines. Thermodynamics, the theory of the steam engine, the steam turbine, internal combustion engines and design.

Required of electrical engineering juniors. Three hours weekly during the second and third terms.

M.E.11 and 12. Hydraulics. A study of the principles of hydraulics, hydraulic machinery and the elements of turbine design.

Required of electrical engineering juniors. Three hours weekly during the first, and two during the second term.

Other general subjects given only to electrical engineering students are:

C.E.3. Elements of Civil Engineering. The work and methods of the civil engineer. This course is given to broaden the ideas of the student, thus enabling the electrical engineer to value properly the labors of his colleagues in this allied department of the profession.

Required of electrical engineering juniors. Two hours weekly during the third term.

E.E.1. Elements of Electricity and Magnetism. This is a course in the fundamental principles of electricity and magnetism. The prerequisite courses are physics 1a and mathematics 5.

Required of electrical engineering juniors. Four hours weekly during the first term.

E.E.2. Theory of Direct Current Machines. The prerequisite course is E.E.1.

Required of electrical engineering juniors. Three hours weekly during the second term.

E.E.3. Principles of Alternating Currents. This course includes the representation of alternating current waves and a review of the theory of complex numbers. The prerequisite course is E.E.2.

Required of electrical engineering juniors. Three hours weekly during the third term.

E.E.4. Theory of Alternating Current Machines. This course deals with the transformer and the alternator. The prerequisite course is E.E.3.

Required of electrical engineering seniors. Three hours weekly during the first term.

E.E.5. Theory of Alternating Current Machines Continued. This course deals with the synchronous motor, rotary converter, and alternating current commutator motors. The prerequisite course is E.E.4.

Required of electrical engineering seniors. Three hours weekly.

E.E.6. Advanced Electrical Engineering Theory. This is a

course in simple transient phenomena, principles of illumination, and the underlying principles of electric railroading and power plant economics. The prerequisite course is E.E.5.

Required of electrical engineering seniors. Three hours weekly during the third term.

E.E.14. Seminar. This is a course intended to bring the student into touch with phases of electrical engineering which do not enter directly into the work of the other courses. It includes lectures by members of the department, the presentation and discussion of papers by the students themselves, and local trips of inspection to the works of the General Electric Company.

Required of electrical engineering seniors. One two-hour period weekly during the first term.

E.E.15. Seminar. This is a continuation of E.E.14 during the second term.

E.E.16. Seminar. This is a continuation of E.E.14 and E.E.15 during the third term.

E.E.21. Junior Electrical Laboratory. This is a course in laboratory work in which studies and measurements of elementary circuits are carried on.

Required of electrical engineering juniors. One afternoon per week during the first term.

E.E.22. Junior Electrical Laboratory. This is a course in laboratory work dealing with more advanced direct current measurements and the study of elementary alternating current circuits.

Required of electrical engineering juniors. Two afternoons weekly during the second term.

E.E.23. Junior Electrical Laboratory. This is a course in laboratory work dealing with more advanced direct current measurements and the study of elementary alternating current circuits.

Required of electrical engineering juniors. Two afternoons weekly.

E.E.24. Senior Electrical Laboratory. This is a course in laboratory work dealing with alternating current circuits and apparatus, especially the transformer and alternator.

Required of electrical engineering seniors. Two afternoons weekly during the first term.

E.E.25. Senior Electrical Laboratory. This is a course in laboratory work dealing with the synchronous and induction motors and the synchronous converter.

Required of electrical engineering seniors. Two afternoons weekly during the second term.

E.E.26. Senior Electrical Laboratory. This is a course in laboratory work taking up advanced studies with special apparatus and completing the work of the preceding course.

Required of electrical engineering seniors. Two afternoons weekly during the third term.

E.E.34. Electrical Machine Design. This is a course in the designing of electrical apparatus including the special study of the transformer.

Required of electrical engineering seniors. Three hours weekly during the first term.

E.E.35. Electrical Machine Design. This is a course in the designing of electrical apparatus including the special study of the alternator.

Required of electrical engineering seniors. Three hours weekly during the second term.

E.E.36. Electrical Machine Design. This is a course in the design of electrical apparatus including the special study of the direct current generator and rotary converter.

Required of electrical engineering seniors. Three hours weekly during the third term.

Thesis. All students are required to prepare a thesis on some original problem. For this work a credit of 3 hours is allowed during the second and third terms of the senior year.

The objects of the course are primarily to acquaint the student with the methods and procedure of investigating problems which have never previously been solved, and secondarily to penetrate deeply into a particular specified branch of the subject as a con-

trast to the more general and fundamental work of the regular courses.

Special Lectures. During the year a few lectures on highly specialized subjects are given by engineers who are also attending the graduate courses in Electrical Engineering. These lectures are open to juniors, seniors and graduates, and are optional.

To juniors, seniors and graduate students of the course is available the notable privilege of becoming, upon payment of a nominal fee, members of the Schenectady Section of the American Institute of Electrical Engineers. Throughout the winter occur, before this society, a succession of lectures probably without an equal except before the national body itself.

Electrical Laboratory Equipment

The electrical engineering laboratory is a commodious, well-lighted building, and permits the arrangement and grouping of the machines in a flexible relation to each other.

The ground plan of the building is T-shaped. The upper bar of the T is two stories. The lower floor is devoted to the main laboratory, which is 101 ft. by 35 ft. outside dimensions.

Two large recitation rooms and a library and reading room occupy the major portion of the second floor.

The purpose of a college laboratory of electrical engineering is two-fold: To familiarize the student with the shape, appearance, relative proportions and construction of modern electrical apparatus, and to instruct him in the handling, assembling, testing and operation of electrical apparatus under normal and abnormal conditions.

Because of the great variety and large size of modern electrical apparatus, the former purpose can be fulfilled very incompletely only, even in the largest and best equipped college laboratories. Through the favorable disposition of the General Electric Company, by giving the electrical engineering students of Union College free access to the works and testing rooms, this purpose is admirably fulfilled here, and by frequent and regular inspection trips to the works and testing department of the Company under the direction of the college instructors, which trips constitute an

integral part of the laboratory instruction, the students gain a very intimate knowledge of modern electrical apparatus of all types and sizes, not only when assembled and in operation and test, but also during their construction in the shops.

In equipping the college laboratory special consideration was therefore given to the selection only of such representative types of apparatus as can be handled, operated and tested by the students, and machines are of a size sufficiently large to correspond to modern practice, but not so large as to make the operation under abnormal conditions—that is, under conditions which as a rule are specially instructive—unsafe for the apparatus. All such machinery as the student can not be permitted to handle freely was excluded from the equipment.

Power is supplied from the following sources: A motor-generator set consisting of a 55-h.p. 3-phase 240 volt synchronous motor direct connected to a 30-kw., 125 volt direct current generator; a motor-generator set consisting of a 17.5 kw. direct current generator direct connected to a 3-phase 220-volt induction motor; connection with the 550-volt direct current trolley circuit of the Schenectady Railway Company; connection with a three-phase 2300-volt power circuit of the Schenectady Illuminating Company. In the latter case voltage is reduced by banks of step-down transformers, so that the students can handle the safe low-tension circuits only.

A secondary supply for standardization of instruments is also secured by means of a group of lead plate storage batteries charged by a mercury arc rectifier upon the alternating current power circuit.

The laboratory equipment contains a large number of direct and alternating current generators and motors of various design and capacity suitable for testing and all of the general and much special experimentation, also a large number of transformers coils and condensers and the measuring instruments suitable for the work.

In addition there are standardizing instruments for the accurate calibration of meters, and for determining resistance, inductance and capacity.

Numerous arc-lamps of different types are arranged for operation either by a constant current transformer or from the 500-volt direct current supply or from a special 2,500-volt direct current generator.

Students are introduced to the direct study of wave forms and some transient phenomena by the use of an oscillograph, and to the phenomena of very high frequency through a fairly complete wireless telegraph installation.

For special study along the line of telephony, there is a complete set of apparatus presented by the Western Electric Co., including every part that comes into operation between two persons who may be located in different cities.

A second laboratory is located in the basement of Washburn Hall, and consists of two very large rooms which are used mainly for advanced research and special experimentation. In this laboratory every graduate student has his desk and can set up his work without danger of interference from other workers. The equipment is of a special nature and varies according to the work being done.

In particular should be mentioned an artificial transmission line, constructed of large glass tubes wound with wire, and containing distributed capacity, so proportioned as to accurately represent an actual line of about one hundred and twenty-eight miles length. The object of the line is to permit the study of the effects of switching and other transient effects which have been only partially understood in the design and operation of high voltage, high power systems.

Inspection Trips

It is desirable that each student in the electrical engineering courses participate during his college life in extended trips of inspection of engineering activities. Such trips are, therefore, arranged at a low cost to each man and vary from year to year. Last year the excursion was to Pittsfield and covered only one day. It is the policy of the department to continue to arrange such trips and to conduct them when sufficiently representative groups of men can attend.

Graduate Courses.

The electrical engineering department offers the following graduate courses in residence.

The Degree of M. S. To students desiring to continue their studies a short time beyond the four-year course, a graduate course of one year is offered in which, besides instruction in higher branches of electrical engineering, there will be occasion to carry out original investigations in electrical engineering practice on subjects closely connected with the most recent advance of electrical engineering. This course leads to the degree of Master of Science in Electrical Engineering, and is open to graduates of Union College or of other institutions approved by the faculty. The work is to be done in residence, but the lectures are given at such hours as frequently permit students and young engineers of the General Electric Company to attend.

The following courses in Electrical Engineering are given :

E.E.101. A course dealing with transient phenomena and with problems in electro-dynamics.

E.E.102. A course which supplements E.E.101 and covers experimental work of an advanced character.

E.E.103. Lectures given at irregular intervals by Dr. Steinmetz on some phases of electro-physics.

The fees are \$25 per term, three terms constituting a year.

The Degree of Ph. D. The degree of Doctor of Philosophy is not given on the completion of a certain amount of work or the study of stated subjects for a definite period of time, but is intended to be a mark of breadth of training and high attainment. It will be conferred upon the candidate upon the satisfactory fulfillment of the following conditions :

1. The applicant for admission to this course must present a Master's degree received in recognition of work of a nature indicating preparation for advanced electrical study.

2. The candidate must spend at least two years in resident work under direction of the faculty.

3. The major subject of study must be electrical science.

4. Two minor subjects of study must be pursued, one of which is to be philosophy.

5. At the completion of the course, and two months before the conferring of the degree, a suitable thesis must be presented to the head of the electrical engineering department, representing original work and indicating strength and ability in independent investigation.

6. Fifty printed and bound copies of the thesis must be deposited in the college library before the successful candidate may receive the diploma for his degree. The degree may be conferred, however, before such copies are deposited, upon the presentation to the treasurer of proper security for their provision. In this case, a bound typewritten copy shall be placed in the library previous to the conferring of the degree.

The fees are \$25 per term, three terms constituting a year.

Admission

The entrance requirements are given in detail on pages 30-40. Correspondence regarding admission to the undergraduate courses should be addressed to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* Correspondence regarding admission to the graduate courses in electrical engineering may be addressed to

DR. ERNST J. BERG

Professor of Electrical Engineering
Schenectady, New York.

CURRICULA OF ENGINEERING COURSES

The numeral after a subject refers to the course as described in the departmental statement; the number in parenthesis refers to the page where the statement is given.

Courses Leading to Degree of B.E.

Freshman Year, all courses

First Term

French 1 or 1a.....	(49)	3 hours
German 1a or 1.....	(46)	3 hours
Rhetoric 1.....	(52)	2 hours
Freehand Drawing GE11.....	(92)	3 hours
Mathematics GE1.....	(91)	5 hours
Hygiene.....	(71)	2 hours
Lectures GE61.....	(94)	
Total		18 hours

Second Term

French 1 or 1a.....	(49)	3 hours
German 1a or 1.....	(46)	3 hours
Rhetoric 1.....	(52)	2 hours
Mathematics GE1.....	(91)	5 hours
Mensuration GE21.....	(93)	2 hours
Mechanical Drawing GE12.....	(92)	3 hours
Lectures GE61.....	(94)	
Total		18 hours

Third Term

French 1 or 1a.....	(49)	3 hours
German 1a or 1.....	(46)	3 hours
Rhetoric 1.....	(52)	2 hours
Mathematics GE1.....	(91)	5 hours
Surveying and Plotting GE22.....	(93)	2 hours
Hygiene.....	(71)	2 hours
Commencement Term Work GE63.....	(94)	
Total		17 hours

In the second term one credit hour is required in gymnastics.

Sophomore Year, all courses

First Term

Rhetoric 10.....	(55)	1 hour
Calculus GE2.....	(92)	3 hours
Mechanics GE6.....	(92)	3 hours
Physics 2.....	(64)	4 hours

Chemistry 1.....	(66)	3 hours
English Literature 3.....	(53)	2 hours
Topographical Surveying GE23	(93)	2 hours
Summer Vacation Work GE62	(94)	
Total		18 hours

Second Term

Rhetoric 10.....	(55)	1 hour
Calculus GE2.....	(92)	3 hours
Mechanics GE6	(92)	2 hours
Physics 2.....	(64)	4 hours
Chemistry 1.....	(66)	4 hours
English Literature 3.....	(53)	2 hours
Descriptive Geometry GE13	(92)	3 hours
Total		19 hours

Third Term

Rhetoric 10.....	(55)	1 hour
Calculus GE2.....	(92)	3 hours
Mechanics GE6	(92)	2 hours
Physics 2.....	(64)	3 hours
Chemistry 1.....	(66)	4 hours
English Literature 3.....	(53)	2 hours
Descriptive Geometry GE14	(93)	3 hours
Lectures GE61.....	(94)	
Commencement Term Work GE63	(94)	
Total		18 hours

Junior Year, General Engineering, Option A*First Term*

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Applied Mechanics GE31.....	(98)	4 hours
Chemical Laboratory 2.....	(66)	4 hours
Highways and Pavements GE38.....	(100)	4 hours
Topographical Surveying and Mapping GE24.....	(97)	3 hours
Summer Vacation Work GE62	(94)	
Total		18 hours

Second Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Mechanics of Materials and Eng. Laboratory GE32....	(98)	5 hours
Kinematics and Machine Drawing GE56.17.....	(102,97)	3 hours
Hydraulics GE51 ..	(101)	3 hours
Thermodynamics GE57	(102)	2 hours
Stereotomy GE16.....	(96)	2 hours
Total		18 hours

Third Term

Rhetoric 9.....	(55)	1 hour
History 2.....	(57)	2 hours
Stresses GE33.....	(98)	4 hours
Motors GE58.....	(102)	3 hours
Route Surveying GE25.....	(97)	3 hours
Spherical Trigonometry and Astronomy GE9.....	(96)	3 hours
Sanitary Biology 3.....	(68)	2 hours
Inspection Trips		
Commencement Term Work GE63	(94)	_____
		Total 18 hours

Junior Year, General Engineering, Option B*First Term*

Rhetoric 11.....	(55)	1 hours
History 2.....	(57)	2 hours
History 1.....	(56)	2 hours
Applied Mechanics GE31	(98)	4 hours
Highways and Pavements GE38.....	(100)	4 hours
Chemical Laboratory 2.....	(66)	3 hours
Topographical Surveying and Mapping GE24	(97)	3 hours
Summer Vacation Work GE62	(94)	_____
		Total 19 hours

Second Term

Rhetoric 9.....	(55)	1 hour
History 2.....	(57)	2 hours
History 1.....	(56)	2 hours
Elements of Law GE42.....	(100)	3 hours
Mechanics of Materials and Eng. Laboratory GE32...	(98)	5 hours
Hydraulics GE51.....	(101)	3 hours
Thermodynamics GE57	(102)	2 hours
		Total' 18 hours

Third Term

Rhetoric 9.....	(55)	1 hour
History 2.....	(57)	2 hours
History 1.....	(56)	2 hours
Law of Property and Contract GE43.....	(100)	3 hours
Stresses GE33.....	(98)	4 hours
Route Surveying GE25	(97)	3 hours
Motors GE58.....	(102)	3 hours
Inspection Trips		
Commencement Term Work GE63	(94)	_____
		Total 18 hours

Junior Year, Sanitary Engineering

First Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Applied Mechanics GE31.....	(98)	4 hours
Chemical Laboratory 2.....	(66)	4 hours
Highways and Pavements GE38.....	(100)	4 hours
Topographical Surveying and Mapping GE24.....	(97)	3 hours
Summer Vacation Work GE62.....	(94)	
		Total 18 hours

Second Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Mechanics of Materials and Eng. Laboratory GE32.....	(98)	5 hours
Kinematics and Machine Drawing GE56.17.....	(102,97)	3 hours
Hydraulics GE51.....	(101)	3 hours
Thermodynamics GE57.....	(102)	2 hours
Stereotomy GE16.....	(96)	2 hours
		Total 18 hours

Third Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Stresses GE33.....	(98)	4 hours
Motors GE53.....	(102)	3 hours
Route Surveying GE25.....	(97)	3 hours
Spherical Trigonometry and Astronomy GE9.....	(96)	3 hours
Sanitary Biology 3.....	(68)	2 hours
Inspection Trips		
Commencement Term Work GE63.....	(94)	
		Total 18 hours

Junior Year, Electrical Engineering

First Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Applied Mechanics ME1.....	(112)	3 hours
Hydraulics ME11,12.....	(112)	3 hours
Electrical Engineering Theory EE1.....	(113)	3 hours
Electrical Laboratory EE21.....	(114)	2 hours
Electives.....	(80)	3 hours
		Total 17 hours

Second Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Heat Engines ME _{2, 3}	(112)	3 hours
Hydraulics ME _{11, 12}	(112)	2 hours
Electrical Engineering Theory EE ₂	(113)	3 hours
Electrical Laboratory EE ₂₂	(114)	4 hours
Electives.....	(80)	3 hours

Total 18 hours

Third Term

Rhetoric 11.....	(55)	1 hour
History 2.....	(57)	2 hours
Heat Engines ME _{2, 3}	(112)	2 hours
Elements of Civil Engineering C.E. ₃	(113)	2 hours
Electrical Engineering Theory EE ₃	(113)	3 hours
Electrical Laboratory EE ₂₃	(114)	4 hours
Electives.....	(80)	3 hours

Total 17 hours

Senior Year, General Engineering, Option A*First Term*

Economics 3.....	(60)	3 hours
Railroad and Trolley Road Construction GE ₃₇	(99)	5 hours
Engineering Stresses GE ₃₄	(98)	4 hours
Economic Geology 6.....	(68)	2 hours
Motors and Motive Power GE ₅₈	(102)	2 hours
Engineering Mathematics GE ₇	(96)	2 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		
Summer Vacation Work GE ₆₂	(94)	

Total 18 hours

Second Term

Electrical Machinery GE ₅₉	(102)	3 hours
Method of Least Squares GE ₈	(96)	2 hours
Engineering Design and Construction GE ₃₅	(93)	4 hours
Water Supply Engineering GE ₅₂	(101)	3 hours
Engineering Law GE ₄₁	(100)	3 hours
Engineering Mathematics GE ₇	(96)	2 hours
Building Construction GE ₃₆	(99)	2 hours
One Literary Essay		
One Technical Essay		

Total 19 hours

Third Term

Engineering Law and Procedure GE41	(100)	3 hours
Geodesy and Field Astronomy GE26	(97)	3 hours
Outlines of Architecture GE64	(102)	2 hours
Engineering Design and Construction GE35	(98)	4 hours
Water Supply, Sewerage, and Sewage Disposal GE53 (101)		5 hours
Reinforced Concrete GE40	(99)	1 hour
Thesis		

 Total 18 hours
Senior Year, General Engineering, Option B*First Term*

Economics 1	(60)	3 hours
Comparative Politics 4	(57)	3 hours
Principles and Laws of Corporations GE44	(100)	3 hours
Motors and Motive Power GE58	(102)	2 hours
Engineering Stresses GE34	(98)	4 hours
Engineering Mathematics GE7	(96)	2 hours
Economic Geology 6	(69)	2 hours

One Literary Essay

One Technical Essay

Inspection Trips

Summer Vacation Work GE62(94)_____

 Total 19 hours
Second Term

Economics 2	(60)	3 hours
Comparative Politics 4	(57)	3 hours
Principles of Finance and Financial Operations GE46(101)		2 hours
Electrical Machinery GE59	(102)	3 hours
Engineering Mathematics GE7	(96)	2 hours
Engineering Design and Construction GE35	(98)	4 hours
Building Construction GE36	(99)	2 hours

One Literary Essay

One Technical Essay

 Total 19 hours
Third Term

Economics 2	(60)	3 hours
International Law, H.4	(57)	3 hours
Principles of Administration GE47	(101)	3 hours
Engineering Design and Construction GE35	(98)	4 hours
Outlines of Architecture GE64	(102)	2 hours
Principles of Accounting GE48	(101)	3 hours
Reinforced Concrete GE40	(99)	1 hour

Thesis

 Total 19 hours

Senior Year, Sanitary Engineering*First Term*

Motors and Motive Power GE58.....	(102)	2 hours
Engineering Stresses GE34.....	(98)	4 hours
Heating and Ventilation GE60.....	(109)	3 hours
Chemical Laboratory 5.....	(67)	3 hours
Economic Geology 6.....	(69)	2 hours
Economics 1.....	(60)	3 hours
Engineering Mathematics GE7.....	(96)	2 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		
Summer Vacation Work GE62.....	(94)	_____
		Total 19 hours

Second Term

Engineering Law GE41.....	(100)	3 hours
Engineering Design and Construction GE35.....	(98)	4 hours
Water Supply Engineering GE52.....	(101)	3 hours
Chemical Laboratory 5.....	(67)	4 hours
Electrical Machinery GE59.....	(102)	3 hours
Engineering Mathematics GE7.....	(96)	2 hours
One Literary Essay		
One Technical Essay		
Inspection Trips		
		Total 19 hours

Third Term

Engineering Law and Procedure GE41.....	(100)	3 hours
Engineering Design and Construction GE35.....	(98)	4 hours
Sewerage and Sewage Disposal GE53.....	(101)	5 hours
Sanitary Analysis GE55.....	(109)	4 hours
Sanitation GE54.....	(109)	2 hours
Thesis		
		Total 18 hours

Senior Year, Electrical Engineering*First Term*

Economics 3.....	(60)	3 hours
Electrical Engineering Theory EE4.....	(113)	3 hours
Seminar EE14.....	(114)	1 hour
Electrical Laboratory EE24.....	(114)	4 hours
Electrical Apparatus Design EE34.....	(115)	3 hours
Electives.....	(80)	3 hours
		Total 17 hours

Second Term

Electrical Engineering Theory EE5.....	(113)	3 hours
Seminar EE15	(114)	1 hour
Electrical Laboratory EE25	(115)	4 hours
Electrical Apparatus Design EE35.....	(115)	3 hours
Thesis.....	(95)	3 hours
Electives	(80)	3 hours

Total 17 hours

Third Term

Electrical Engineering Theory EE 6.....	(113)	3 hours
Seminar EE16	(114)	1 hour
Electrical Laboratory 26.....	(115)	4 hours
Electrical Apparatus Design EE36.....	(115)	3 hours
Thesis	(95)	3 hours
Electives	(80)	3 hours

Total 17 hours

ATTENDANCE AND STANDING

Registration. Every student must report at the registrar's office at the beginning of each term and register college or local residence.

Any change of residence during the term must be reported at once at the treasurer's office.

Changes of Course. Students are not permitted to pass from one course to another, or to take any studies out of their regular order, without the specific authorization of the faculty.

Chapel. Morning worship is held in the chapel every college day and attendance is required of all students.

Reports. A daily record of scholarship and of attendance at class and chapel is kept and a report is sent at the close of each term, or more frequently, to the student's parent or guardian.

Standing. There are four grades of scholarship:—from 9 to 10 inclusive, first grade; from 8 to 8.9, second grade; from 7 to 7.9, third grade; from 6 to 6.9, fourth grade. A student who receives a mark of 4 to 5.9 is reported as conditioned; below 4, as having failed. In the mathematical studies of the engineering course the sustaining mark is 7, and any mark below 5 indicates failure.

A student who is reported as having failed in any subject must take that subject again in class; or he may be required, at the option of the department concerned, to make up the subject under an approved tutor, in such manner as the department may designate, and to pass an examination in it at the second conditions examination after the imposition of the mark of failure.

Those receiving the highest marks for the whole course are entitled to appointment as commencement orators, five places being assigned to students in the academic courses and five to students in the engineering courses.

Absences in General. Absences are entered, in every course, against a student from the beginning of a term until he reports his return to the registrar.

Absences are recorded as of two kinds:—excused and unexcused. Excuses are given only by the committee on absences, which meets every Monday afternoon from two to five o'clock.

Class-room Absences. Attendance at all exercises is required and it is expected that no student will be absent except in case of unavoidable necessity.

Applications for excuses must be made to the committee on absences the first Monday following the date of absence.

No excuse remits any work of the term. The work lost by reason of excused absence must be made up in a manner satisfactory to the head of the department concerned, unless the nature of the work renders this impossible, in which case the student's grade will suffer.

After a number of unexcused absences equal to three weeks of recitations in any subject, the student is not allowed to continue his work in that subject, but must take it with the succeeding class.

Chapel Absences. Twelve absences without excuse are allowed each term. All absences after the first twelve lower the standing at the rate of one unit for every two absences.

No absences are excused except for protracted illness or for reasons in every way exceptional.

Applications for excuse from chapel for a term must be made within the first two weeks of that term.

In the determination of a student's general standing, marks for chapel attendance are counted as the equivalent of a one hour per week recitation. They affect the granting of scholarships and the selection of honor men.

Conditions. Students who may be admitted with entrance conditions must remove them not later than the March examinations. Those who fail to meet this requirement are classed as irregular students. Those who fail to remove all entrance conditions before the beginning of the next college year will not be admitted to any of the work of that year. No student who has any conditions unsatisfied at the close of the conditions examinations in September at the opening of the college year, is permitted to continue with his class without the express authorization of the faculty.

Conditions not removed at the next conditions examination held after their imposition must be made up in class at the first

opportunity, and this work takes precedence of the regular work in case of conflict in the schedule. No senior who has failed to make up all his back work by the end of the second term of senior year can be recommended for a degree, except by special vote of the faculty.

Examinations for the removal of conditions occur on the Saturday next preceding the opening of the fall term, and on the first Friday and Saturday in December, March and May, as indicated in the college calendar. Registration for these examinations closes at 12 M. on the Saturday next preceding the date set for each. A fee for each examination to be taken must be paid at the time of registration, at the college office.

Students who have been excused by the dean, in writing, from any term examination are reported "Not examined" and may be examined later, at a time to be approved by the instructor, but such examination cannot be postponed beyond the first conditions examinations after such report. A failure to pass is regarded as a condition and must be made up at the next following conditions examination.

Unless excused in writing by the dean, students absent from term examinations are reported as "Not sustained," or "Failed."

Any student permitted by the faculty to anticipate or defer a term examination is required to pay a fee for each special examination made necessary.

A failure to report at any appointed examination is regarded as a trial, unless previously excused.

Irregular Students. Students who are seriously deficient in standing may be dropped to a lower class, or if the deficiency is such as to leave a prospect of regaining class standing, may be rated as irregular students. Irregular students have no class relation or class privilege; they are debarred from competition for prizes and from the attainment of special honors.

The evidence that a student's continuance in college is resulting in no advantage to himself, or in harm to others, will occasion his separation from the institution.

EXPENSES

Registration fee	\$5.00
Tuition, A. B., Ph. B. and B. S. courses, per term.....	30.00
Tuition, engineering courses, per term.....	25.00
Graduate courses in engineering, per term.....	50.00
Room rent in dormitories, per term.....\$20 to	25.00
Incidental fee, for maintenance of grounds and public rooms, use of library, gymnasium, etc., per term.....	8.00
Graduation fee, including diploma.....	15.00
Chemical laboratory fees:	
Courses 1 and 1a, per term.....	8.00
Courses 2, 2a, 3, 4 and 5, per term.....	15.00
Course 6, per term.....	20.00
Electrical laboratory fees:	
Junior year, per term.....	7.00
Senior year, per term.....	10.00
Biological laboratory fees:	
Courses 1 and 5, per term.....	2.00
Course 4, per term.....	6.00
Physics laboratory fees:	
Course 1a, per term.....	4.00
Course 2, per term.....	5.00
Conditions examination fee	2.00
Fee for certificate of work done.....	2.00
Fee for certificate of graduation.....	1.00
Master's degree, registration and diploma.....	20.00

In the course leading to the degree of Doctor of Philosophy the maximum payment will be \$300 if the degree be earned in five years from the time of registration.

Students who take their senior year's work at the Albany Medical College as provided on page 29, are charged \$125 for the year's tuition, \$50 to be paid to the treasurer of Union College and \$75 to the treasurer of the Albany Medical College.

Tuition and other fees are due in advance on the first day of each term, and are not returnable.

Students must conform to the rules of the treasurer's office regarding registration at the opening of each term, and will

not be admitted to any classes or laboratories until the required fees are paid.

No deductions are made because of absence from college.

No part of a term bill will be refunded for any cause.

Damage done by students to college property will be charged to their account.

No degree, certificate or dismissal will be given to any student until his bills are paid.

Board can be procured for \$3.50 to \$5 a week.

It is the custom of the student body to levy an annual campus tax of sixteen dollars, six dollars of which is payable at the beginning of the fall term, five dollars at the beginning of the winter term, and five dollars at the beginning of the spring term. This money is used for the support of the different branches of athletics and of the musical association.

College Rooms

The college has two steam-heated dormitories, accommodating one hundred students. Most of the rooms are arranged in suites of two, and are all unfurnished; they are rented at prices varying from \$60.00 to \$75.00 per year for each student occupying a room. Students about to enter college who wish rooms in the dormitories should make early application to the assistant treasurer for a list of rooms giving location and price. No room is secured until a lease is signed and filed in the college office; a student must occupy the room for which he signs, as transfers are not allowed. The rooms are cared for by competent persons, employed and paid by the college; each occupant of a college room will be held responsible for any damage done to the room. At the end of the college year students giving up their rooms for any reason whatsoever must remove all furniture and property from their rooms not later than the Saturday following commencement day, as after this time the dormitories will be closed until the Saturday before the first registration day of the fall term. The dormitories will also be closed during the Christmas recess.

Students leaving property in their rooms during the vacations do so at their own risk.

The Union College Christian Association offers its services to students who find it necessary to secure rooms in the city. The association inquires into the character of all places offered as lodgings for students, and, shortly before the beginning of the college year, provides a list of approved places.

Employment Bureau

The Christian Association acts as a bureau with the object of giving assistance to students who desire employment for the purpose of meeting the expenses of a college education. It has been found that many opportunities for work exist in Schenectady by which students may earn from \$2 to \$4 per week, during term-time, without seriously interfering with their college studies. A considerable number of students meet the expense of board by acting as waiters in the various restaurants and boarding houses in the city. Others find employment as clerks in stores on Friday evenings and Saturdays; others in caring for furnaces and in other work about private residences. Applications for the assistance of the bureau may be addressed to the secretary of the faculty.

SCHOLARSHIPS

Funds given especially for this purpose enable the college to offer aid to a number of students each year, as follows:

General Scholarships

Available for students in the A. B., Ph. B. and B. S. courses.

Scholarships covering a part or the whole of the tuition charges are granted to students upon the following conditions:

1. The declaration of a purpose to remain in Union College until graduation.
2. An acknowledgment that the aid received is regarded as a debt of honor, to be paid as soon as possible after leaving college.
3. The presentation of satisfactory evidence of financial need.

Scholarship aid will be withdrawn temporarily upon the failure of the student to be sustained in any subject, or upon his failure to maintain an average grade of eighty per cent. in the studies of any term, and after it has been withdrawn for three successive terms it will not be renewed.

Any serious breach of college discipline, evidence of moral delinquency, or repeated unnecessary expenditures will also result in the withdrawal of scholarship aid.

Credentials necessary for admission to another college will not be given to any scholarship student until he has repaid to the college treasury the full amount of scholarship aid received.

Application blanks will be provided by the secretary upon request.

John David Wolfe Memorial Scholarships

The income of a fund of fifty thousand dollars established by the generosity of Miss Catharine Lorillard Wolfe is designed to aid students from the southern states.

These scholarships are available for students in all courses and are governed by the conditions named above.

Application blanks will be provided by the secretary upon request.

Levi Parsons Scholarships

A generous benefaction by the late Hon. Levi Parsons, of Gloversville, N. Y., maintains several scholarships in each class, yielding at least one hundred and fifty dollars a year each.

All scholarships begin at the rate of one hundred and fifty dollars a year. After the first term the value of the scholarship depends upon the standing of the student.

Scholarships of \$300 a year are granted to students who have had, in the preceding term, an average grade of 90 per cent. or more.

Scholarships of \$200 a year are granted to students who have had, in the preceding term, an average grade of 85 per cent. or more.

Scholarships of \$150 a year are continued to students who have had, in the preceding term, an average grade of 80 per cent. or more.

Among applicants, preference is given:

First, to blood relatives of the founder, bearing his name and living in the county of Fulton, Montgomery or Hamilton, in the State of New York, and especially to those bearing his name and living in Gloversville or Johnstown, Fulton county.

Second, to applicants living in the following places, according to the following order:

1. The city of Gloversville, Fulton county.
2. The city of Johnstown.
3. The township of Johnstown.
4. The county of Fulton.
5. The adjoining counties of Montgomery and Hamilton.
6. The blood relatives living in any other part of the United States.

Nomination to scholarships is made by the board of directors of the Gloversville Free Library; and the nominees must satisfy the college requirements for admission. Applications are received by the directors of the Gloversville Free Library, Gloversville.

The continuance of these scholarships is subject to the rules stated on page 135 concerning the withdrawal of the general scholarships of the college.

Thomas Armstrong Scholarships

The late Thomas Armstrong, of Plattsburg, N. Y., provided for the grant of scholarships to residents of Clinton county, sons of practical farmers.

Nominations to these scholarships are made by the board of supervisors of Clinton county, and the yearly value of each scholarship is not to exceed two hundred dollars.

R. C. Alexander Prize Scholarship

The sum of four thousand dollars has been given in memory of the late Robert Carter Alexander, of the class of 1880, and a life trustee of the College, to be devoted to the establishment of a scholarship for the encouragement of classical studies.

The income of this fund, amounting to two hundred dollars per year, is awarded as a prize scholarship, upon the following conditions:

1. Candidates must be students in the classical course, and of approved moral character.
2. They must be free from conditions and must have obtained an average of at least eighty per cent. in the studies of the first two terms of the freshman year.
3. They must pass successfully a special examination at the close of the freshman year in each of the following subjects: Latin, Greek, mathematics, English composition, and either French or German. These examinations will be based upon the work of the freshman year.
4. The award will be made to the candidate obtaining the highest general average in these examinations and in all the previous work of the college course.*
5. The prize scholarship will be forfeited upon evidence of moral delinquency, or upon failure to maintain an average grade of ninety per cent. in the work of any subsequent term. The scholarship, once lost, cannot be regained, but will be awarded, upon the above conditions, to a student in the next entering class.
6. All questions pertaining to the administration of this

*This scholarship is now held by Donald A. Coulter, of the class of 1915.

scholarship will be determined by a committee composed of the president of the college, the chairman of the scholarship committee of the faculty, and a member of the board of trustees.

Horace B. Silliman Scholarship

Three scholarships were founded by the late Horace B. Silliman, of the class of 1846, giving to each recipient the income from two thousand dollars annually.

These scholarships are awarded to active members of the college Young Men's Christian Association by a committee composed of the president, the dean, and the president of the Young Men's Christian Association, under such rules and conditions as may be determined by such committee, preference being given to students in the classical course.

The award is made to one student annually at the close of the freshman year.

Daniel F. Pullman Scholarship

The late Daniel F. Pullman, of Knox, Albany county, New York, provided in his will for the establishment of a scholarship of the value of \$120 a year, to be given to a student in the classical course.

The award is made by the faculty, and in accordance with the terms of the will preference is given to members of the Methodist Episcopal Church.

Alumni Scholarships

Application for appointments to these scholarships must be made before September 1.

Class of 1895 Scholarship. A fund has been given by the class of 1895 which provides for the grant of a scholarship of a yearly value not to exceed one hundred dollars.

The award is made by the faculty and, in accordance with the wish of the donors, preference will be given to descendants of members of the class.

The conditions with respect to college standing governing the

award of the general scholarships of the college apply to this scholarship also.

Graduate Council Scholarships. A fund is given by members of the class of 1887 which provide for two scholarships of the yearly value of one hundred dollars each. These scholarships are subject to the general rules of the college as regards class standing and personal conduct. (Page 135.) The award is made by the donors on nomination by the secretary of the council.

Daniel Vedder Scholarship

By the will of the late Daniel Vedder, of Schenectady, a scholarship has been established, of the annual value of two hundred dollars.

The scholarship is awarded by the faculty, and is given to a student who is preparing to enter the Christian ministry.

The holder must maintain an average standing of ninety per cent., and must pledge himself to abstain from the use of intoxicating liquors and tobacco.

If none of the candidates meets in every respect the conditions stated in the will of the donor, the scholarship will be awarded in such a way as to carry out as fully as possible the wishes of the founder.

The award is made at the end of the freshman year.

Ichabod Spencer Scholarship Fund

The sum of four thousand dollars, to be known as the Ichabod Spencer Scholarship Fund and to be used for general scholarship aid, has been given by Mrs. Catherine Spencer Leavitt in memory of her father, the Rev. Ichabod Spencer of the class of 1822. The proceeds of this fund are used at the discretion of the trustees to aid worthy students in securing an education at Union College.

Law School Scholarships

Applicants for these scholarships, described below, must register at the college office by May 1st of senior year.

John K. Porter Memorial Scholarship. A fund given by Mrs.

John K. Porter, in memory of her husband, is designed to assist students who, after graduating from college, pursue the study of law. The fund provides, at present, for three scholarships of ninety dollars each. The awards are made at commencement to seniors chosen by the faculty.

Gilbert M. Spier Memorial Scholarship. A fund given by Mrs. John K. Porter, in memory of her father, the late Judge Gilbert M. Spier, provides another scholarship for students of law who go from Union College to the Albany Law School, another department of Union University. The sum of ninety dollars is awarded at commencement to the senior chosen by the faculty, the choice being made on the basis of excellence in historical studies.

PRIZES

The following prizes are awarded from funds given especially for this purpose:

Blatchford Oratorical Medals

The Hon. Richard M. Blatchford, LL. D., of New York city, founded oratorical prizes, consisting of two gold medals of the value of the interest on \$1,000, which are given to the two members of the graduating class who deliver at commencement the best orations, "regard being had alike to their elevated and classical character and to their graceful and effective delivery." These medals are awarded by a committee appointed by the trustees, and are presented at the close of the exercises.

Warner Prize

The Hon. Horatio G. Warner, LL. D., of Rochester, N. Y., founded an annual prize to be presented at commencement to the "graduate of Union College, classical or Latin-scientific course who shall reach the highest standing in the performance of collegiate duties, and also sustain the best character for moral rectitude and deportment, without regard to religious practice or profession." The prize is a silver cup and is awarded by the faculty.

Ingham Prize

The Hon. Albert C. Ingham, LL. D., of Meridian, N. Y., founded an annual prize of the interest of \$1,000 (in the form of plate, or medal, or money, or both medal and money, as preferred), to be awarded at commencement to that senior connected with the college for not less than two years who shall offer the best essay on one of two assigned subjects in English literature or history.

The essay must be typewritten, and must contain not less than 4,000 nor more than 4,500 words. Its signature (fictitious) and the writer's real name must be enclosed in a sealed envelope; the signature and the name of the prize being given on the

outside. The essay, with the note, must be presented by noon on the fifteenth day of May.

Allen Essay Prizes

The Hon. William F. Allen, LL. D., of Oswego, N. Y., established a fund of \$1,000, the interest of which is devoted to prizes for the best three essays on any subject, submitted by members of the senior class.

The essay must be typewritten, and must contain not less than 2,500 nor more than 3,000 words, and must be signed and presented (with note, as in the case of the Ingham essay) by noon on May 15th. The prizes are awarded at commencement.

Oratorical Prizes

Prizes are presented at commencement to the two juniors and the two sophomores who deliver the orations best in composition and delivery on the occasion of prize speaking in commencement week. Four juniors and four sophomores are selected for this competition by a committee of the faculty on the fifteenth of April. Candidates must be in full standing on appearance before the committee.

Allison-Foote Prizes

Mr. George F. Allison, of New York city, and the late Wallace T. Foote, of Port Henry, N. Y., founded a prize for the encouragement of debate in the literary societies. The prize consists of \$100 in cash, and is awarded as the result of a public competition between representatives of the Adelpic and Philomathean Literary Societies. Fifty dollars is awarded to the society presenting the strongest argument. The remaining \$50 is awarded to the debater who makes the best single speech, regardless of his society relations. Contestants must have engaged in at least ten debates in their respective societies during the college year immediately preceding. All further details are left to the determination of a committee, consisting of the president, the dean of the college, and the professor of Rhetoric.

Daggett Prize

In 1899 Miss E. Josephine Daggett bequeathed to Union College the sum of \$1,000, the interest of which is devoted to a prize for conduct and character, without respect to scholarship, to be given at Commencement to a senior who shall have passed through a full course of four years at the college.

Pullman Prizes

Mr. Daniel F. Pullman, of Knox, Albany County, New York, bequeathed to Union college the sum of \$2,000 to found two annual prizes. In awarding both prizes, preference is given to members of the Methodist Episcopal Church.

The Pullman Classical Prize. This prize of \$40 is given to that member of the graduating class who, in an attendance of three years, has attained the highest standing in scholarship in the classical course.

The Pullman Engineering Prize. This prize of \$40 is given to that member of the graduating class who has taken the full course in the engineering department and who shall have attained the highest standing in that course.

Baggerly Prizes

Mr. H. L. Baggerly, of the class of 1894, has founded two prizes to be offered annually for the best essays on a question of government. The topic this year is: Rousseau's theory of government as outlined in his Social Contract, and its bearing on the French Revolution. The prizes are of \$60 and \$40, and are open to competition by members of the senior and junior classes. ..

The award is made by a committee of the faculty.

Bailey Prize

A silver cup, of the value of \$50, has been offered by Dr. Frank Bailey, to be awarded annually to that member of the senior class who has rendered the greatest service to the college

in any field. In awarding this prize, consideration will be given to any effort resulting in conspicuous improvement in the conduct of athletic sports or in the character of undergraduate publications; in the increase of college enthusiasm or the elevation of the tone of college life; in the advancement of the interests of the college among preparatory schools or in the community as a whole; or in any addition to those things which bring honor to the name of Union.

Van Orden Prize

The Van Orden Prize was founded by the late Wessel Ten Broeck Van Orden in memory of his uncle Wessel Ten Broeck Van Orden of the class of 1839. It is awarded annually to a member of the freshman class for excellence in English composition. The basis of the award is the class work in rhetoric and composition, and a special essay. The essays are based upon certain works of English literature, the titles of which are announced early in the fall. The prize is the interest on \$1,000, and is awarded partly in books and partly in money.

The Goodrich-Duane Prizes

Two prizes, of \$30 and \$20, are awarded to the best speakers in an extemporaneous debate held in commencement week in each year. A general topic is previously announced, and the particular subject of debate is given on the evening of the contest. The competition is open to students of all classes.

The first prize is given by Mr. James A. Goodrich, of the class of 1879, and the second prize by Dr. Alexander Duane, of the class of 1878.

D. A. R. Prize

A prize of \$25 is offered by the Benkendaal Chapter of the Daughters of the American Revolution to be awarded to the student in American history who most successfully meets the con-

ditions announced at the beginning of the course in the fall of each year.

American History Prize

A prize of \$25 has been offered by Willis T. Hanson, Jr., A. M. for the best thesis on a topic dealing with the history of Schenectady written by a student in any of the American history courses.

The essays must be typewritten in duplicate and must contain not less than 4,000 words. Both copies must be submitted not later than May 1st to the head of the Department of History. The award will be made under the direction of this department, preference being given to theses based upon original sources.

DEGREES AND HONORS

The candidate for a degree must have paid all dues to the college treasurer, and returned all books borrowed from the college library; he must also attend the conferring of degrees, or be expressly excused therefrom. The candidate for a bachelor's degree must have entered college not later than the beginning of the first senior term.

Degrees for Resident Study

The degrees of the college are conferred by authority of the board of trustees upon candidates who have successfully completed courses of resident study, as follows:

The Bachelor's Degree. The degree of Bachelor of Arts will be conferred upon candidates who have successfully completed Course 1, page 28; the degree of Bachelor of Philosophy, upon those who have successfully completed Course 2, page 28; the degree of Bachelor of Science, upon those who have successfully completed Course 3, page 28; the degree of Bachelor of Engineering, upon those who have successfully completed Course 4, first, second or third division, pages 28-29.

The Master's Degree. The degree of Master of Civil Engineering will be conferred upon candidates who have successfully completed Course 5, first division, page 29; the degree of M. S. (in Electrical Engineering) upon those who have successfully completed Course 5, second division, page 29.

The Doctor's Degree. The degree of Doctor of Philosophy will be conferred upon students of electrical science who fulfill the requirements stated on page 119.

Degrees for Non-Resident Study

The following degrees for non-resident study may be conferred upon graduates of Union College who meet the requirements specified below:

Academic Degrees. The degree of Master of Arts or of Master of Science will be given to graduates of Union College who

have been registered as candidates for the degree not less than two years, have completed definite courses of advanced study in two departments, and have submitted a satisfactory thesis and passed satisfactory examinations. The total amount of work done is intended to be the equivalent of one year of resident study.

A year of resident study in any non-professional graduate school, approved at the time of registration by the two departments concerned, will be accepted instead of the two years' study above mentioned on fulfillment of the same conditions regarding thesis and examinations.

Each candidate for this degree must register with the dean of the college his name, address, and the two departments chosen, not later than the fifteenth of October of the year for which he desires registration.

The thesis must be presented to the dean by May first for submission to the faculty in time to provide for all necessary examinations before commencement.

A fee of \$20 is charged, which covers examinations and diploma; of this amount \$10 is payable at the time of registration and \$10 at the time of the final examinations.

Engineering Degrees. On fulfilling the conditions prescribed below graduates of Union College in the general and sanitary engineering courses may become candidates for the degree of Civil Engineer (C. E.); graduates in the course in electrical engineering may become candidates for the degree of Electrical Engineering (E. E.)

The candidate, after the completion of his undergraduate course must have been engaged for at least three years in professional engineering work of a high order and in positions favorable to the acquisition of valuable engineering experience and to the development of professional ability and judgment.

If the candidate's professional experience is found adequate in character and amount, he is required to submit a satisfactory thesis on an approved subject embodying a contribution by himself to engineering knowledge or literature.

If the thesis is found satisfactory the candidate may be called before an examining committee selected by the department in which he is a candidate and must satisfy the committee that his training, experience, judgment and ability are such as to warrant the conferring of the degree.

If, in the opinion of the head of the department concerned, the candidate has satisfactorily met the above requirements he may be recommended for his degree, to be conferred by the trustees at the following commencement.

The diploma fee for this degree is \$10.

Honors

All commencement prizes are limited to A. B., Ph. B. or B. S. students who have entered at or before the beginning of the senior year, and who are in full standing at the close of the second term; and to engineering students entered likewise and in full standing at the close of the second term, in both the engineering course and the English department of the B. S. or Ph. B. course.

Commencement Appointments. These honors are assigned to ten seniors, five from the academic course and five from the engineering courses, on the basis of scholarship, as stated under Standing, page 129. Provisional appointments are made at the close of the second term senior, and become final if those who receive them return the same relative rank to the end of their course. Under present regulations, no other person can become competitors for the Blatchford Oratorical Medals.

Seniors not in full standing at the close of the second term are ineligible to a Commencement appointment.

Students who receive Commencement appointments as the result of the third term's work are excused from speaking unless the faculty direct otherwise.

The Valedictory. This honor is awarded to the senior of highest standing among the ten receiving Commencement appointments.

Special Honors. Special honors are also given at graduation under the following conditions: Any department may offer a

course, approved by the Education Committee, leading to Special Honors. The head of a department may direct the choice of electives in other departments, for honor students, to the number of six hours in each year. The time of registration for honors will be determined separately for each department. The candidate for special honors must have attained in all the studies of the department in which he tries for honors a rank of not less than ninety per cent. of the maximum. The evidence that he has successfully completed the extra course prescribed for him must be submitted not later than June 1st of the senior year to the faculty, who shall decide in each case whether the work is worthy of an honor. The honors attained are stated in the diploma, and the names of the students who take honors are printed on the Commencement programme.

Phi Beta Kappa Society. At the end of the third term of the senior year, one-third of the members of the graduating class in the classical course, candidates for the degree of Bachelor of Arts, may be elected to membership in the Phi Beta Kappa Society. The election is based upon scholarship and character and is given as a rule, to the men who stand highest in scholarship in their class.

The Alpha of New York chapter was established in 1817; and ever since that time election to the society has been one of the highest distinctions to be gained by scholarship.

Sigma Xi. Election to the honorary scientific society of Sigma Xi, is one of the honors open to seniors of marked ability in the scientific and engineering departments. Membership is confined to the faculty, senior candidates for graduation, and alumni. The election occurs during the latter part of the senior year and selections are made on the basis of high general scientific or engineering ability and particularly as a mark of promise of ability in research and independent work.

The society was founded at Cornell University in 1886 and has chapters at more than twenty of the leading colleges and universities of the country. The Union chapter was established in 1887, since which time about one hundred members have been elected by this chapter.

DEGREES CONFERRED
AT THE
ONE HUNDRED AND SEVENTEENTH ANNUAL
COMMENCEMENT

JUNE 11, 1913

Honorary

LL. D.

L. Clark Seeley.....Northampton, Mass.

D. D.

Henry Martyn Morey.....Ypsilanti, Mich.

George Arnot Beattie.....Atlanta, Ga.

L. H. D.

John Franklin Genung.....Amherst, Mass.

M. A.

Frank White.....Albany, N. Y.

In Course

M. A.

James Alexander Barkley.....Mt. Kisco, N. Y.

Neilson C. Hannay.....Wolfville, N. S.

Chauncey Holmes Winters.....Schenectady

M. C. E.

Harry Campbell Hoyt.....Schenectady

George Stanley Meikle.....Schenectady

M. E. E.

Ralph Winne Stearns.....Schenectady

Class of 1913

A. B.

Alexander Galt Duane.....New York City

David Roy Finley.....Geneseo

Frederick Staley Harris.....	Peekskill
Hubert Melville Mann.....	Schenectady
Joseph Patrick Mohair.....	Newton, N. J.
Van Rensselaer Tremper	Albany

Ph. B.

Chatfield Terry Bates.....	Schenectady
William Thomas Cherry.....	
Giles Davis Clark.....	Albany
Norman A. Davis.....	Warren, Pa.
Harold Hunt Dickinson.....	Buffalo
Theodore William Hanigan.....	Schenectady
Stephen Lorenzo Mayham.....	Schoharie
William A. Rogers.....	Yonkers
Melancthon Sutphen Somers.....	Johnstown
Henry Bryan Daly.....	Hudson Falls
Harry Lee Davenport.....	Scotia
Hartley Greaves Dewey	Schenectady
DeForest Van Slyck Garnsey.....	Schenectady
Clarence Wilson Hall.....	
Don King Hutchens.....	Pulaski
Robert Francis La Barron.....	Binghamton
Thomas Marion Marshall.....	Yonkers
Robert Fortney Payne.....	Schenectady
Milton George Wend.....	Albany
Roy Cameron Whitney.....	Oswego

B. E.

Raymond Hilton Bond.....	Washington
James Ransom Braman.....	Port Chester
Charles Francis Brate.....	Albany
Clarence Nicholls Bridge.....	Charlevoix, Mich.
Franklin Henry Hamilton Bryere.....	Raquette Lake
Frederick Miller Champion.....	Clinton
Kenneth Paul Conover.....	Amsterdam
John Cosmos Cronin.....	Glens Falls
Neville Sawrey Dickinson.....	DeLand, Fla.
Clarence Root Fischle.....	Buffalo

Herman Franck, Jr.....	Schenectady
John Henry Gardner, Jr.....	Meadowdale
Ernest Theodore Gilbert.....	Binghamton
Lansings James Gilmore.....	Salem
Richard Keese Hallock.....	Stamford
Nugihalli Narasimha Iengar.....	Bengalore, India
Joseph Kirchenbaum	Schenectady
Richard Perkins Lent.....	Highland
William Melanchthon Johnson Lewis.....	North Troy
Russell Edmund Lowe.....	New York City
Charles Thomas Male.....	Niskayuna
Charles Fred Masterson.....	Barton
Leland Rea McKnight.....	Salem
George Stanley Meikle.....	Schenectady
Carlos Pires Pontual.....	Sao Paulo, Brazil
Philip Noyes Riedinger.....	Elmira
James Moore Roshirt.....	Albany
John Atwood Royce.....	Liberty
Isador Schulman	Schenectady
John Joseph Shea, Jr.....	Albany
Konrad Stern	Clinton
Hugh Montgomery Stoller.....	Schenectady
Franklin Peter Ulrich.....	Scotia
Clyde Diwain Utter.....	Oneonta
George Stewart Van Antwerp.....	Johnstown
Carl Edward Vedder.....	Schenectady
Douglas Weare Whitney.....	Chicago

Valedictory

Nugihalli Narasimha Iengar.....Bengalore, India

Harry Lee Davenport.....	Scotia
Hartley Greaves Dewey.....	Schenectady
Robert Francis LaBarron.....	Binghamton
Hubert Melville Mann.....	Schenectady
Van Rensselaer Tremper.....	Albany

Charles Francis Brate.....	Albany
Nugihalli Narasimha Iengar.....	Bengalore, India
Charles Thomas Male.....	Niskayuna
James Moore Roshirt.....	Albany
Hugh Montgomery Stoller.....	Schenectady

In chemistry.....	Hubert Melville Mann, Schenectady
In Greek.....	Hubert Melville Mann, Schenectady
In mathematics.....	Harry Lee Davenport, Scotia
In philosophy.....	Harry Lee Davenport, Scotia
	Hubert Melville Mann, Schenectady

Hubert Melville Mann

Theodore William Hanigan

Harry Lee Davenport
Theodore William Hanigan
Don King Hutchens

Goodrich-Duane Prizes

Hubert Melville Mann
Norman Alexander Davis

Prizes for Oratory**Juniors**

William Alvin Mudge
Thomas Leland Ennis

Sophomores

Roger William McMillan
Ernest Baker Houghton

Allison-Foote Prizes

Won by the Adelphic Society
and

William Thomas Hanigan

Blatchford Oratorical Medals

1st. Hugh M. Stoller
2nd. Nugihalli N. Iengar

Intercollegiate Debate Medals

Theodore W. Hanigan
Hubert M. Mann
Donald A. Coulter
Charles T. Male

Daggett Prize

Don K. Hutchens

Pullman Prizes

Hubert M. Mann
Hugh M. Stoller

Baggerly Prizes

Hubert M. Mann
Theodore W. Hanigan

Van Orden Prize

James Taylor Landreth

Bailey Prize

Charles Thomas Male

Concordiensis Literary Prizes

Morris P. Schaffer

Arthur L. Hawley

Alexander Prize Scholarship

Donald A. Coulter

John K. Porter Memorial Scholarships

Chatfield T. Bates

Normal Alexander Davis

Van Rensselaer Tremper

Gilbert M. Speir Scholarship

Frederick S. Harris

Horace B. Silliman Scholarship

Revington L. Embree

Daniel Vedder Scholarship

William Carroll Gunning

Phi Beta Kappa

Hubert Mann

Sigma Xi

Charles F. Brate

Harry L. Davenport

Herman Franck, Jr.

Robert F. LaBarron

Hubert M. Mann

Neville S. Dickinson

Nugihalli N. Iengar

Charles T. Male

Hugh M. Stoller

G. Stanley Meikle

Harry C. Hoyt

ALBANY MEDICAL COLLEGE

The Medical College building, situated on Eagle street, Albany, is well appointed in its lecture rooms, laboratories, dissecting room and museums. The laboratories in chemistry and physiological chemistry are fitted with every requisite for the use of the classes and the illustration of the lectures, while the Bender Hygienic Laboratory furnishes unexcelled facilities for instruction in histology, embryology, bacteriology, pathology, experimental physiology, pharmacology and clinical microscopy.

The location of the college is such as to afford superior advantages to the student. The hospitals and dispensaries furnish an abundant supply of material for the illustration of clinical medicine and surgery, while the museums are especially rich in anatomical and pathological preparations.

The course of instruction is graded and extends over four years. The curriculum embraces lectures by professors and lecturers; recitations conducted mainly by instructors, and practical demonstrations, clinical teaching and laboratory work, in which the professors in the different departments are assisted by clinical assistants and demonstrators.

The Albany Hospital and its Tuberculosis Department, St. Peter's Hospital, Child's Hospital, St. Margaret's House, Albany's Hospital for Insurables, County Hospital, South End Dispensary, Albany Orphan Asylum and dispensaries connected with each are, by the regulation of their governing boards, made available for clinical purposes to the students, and appointments to positions on the house staffs of the hospitals in Albany and neighboring places, are annually made and are competed for by the members of the graduating class.

TRUSTEES

President

SIMON W. ROSENDALE

Vice-President

ALDEN CHESTER

Treasurer

ROBERT OLCOTT

Secretary

CHARLES F. VAN BENTHUYSEN

CLARENCE RATHBONE
 OSGOOD H. SHEPARD
 AMASA J. PARKER
 J. TOWNSEND LANSING
 JESSE W. POTTS
 EDWARD A. DURANT
 CLIFFORD D. GREGORY
 EDWARD BOWDITCH
 FREDERICK TOWNSEND

WALTER L. PALMER
 CHARLES GIBSON
 LUTHER H. TUCKER
 EDWARD J. HUSSEY
 ROBERT C. PRUYN
 JAMES B. McEWAN
 *JOHN M. BIGELOW
 CHARLES A. RICHMOND
 EDMUND N. HUYCK

GEORGE C. VAN TUYL, JR.

RECORDER OF ALBANY } *Ex-Officio*
 MAYOR OF ALBANY }

Catalogues are sent with care, and graduates of the college changing their post-office address, or not receiving them, will please notify

WILLIS G. TUCKER, M. D., *Registrar*

ALBANY MEDICAL COLLEGE

Albany, New York

*Died August 25, 1913.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor of the University

*JOHN MILTON BIGELOW, M. D., PH. D.
Emeritus Professor of Materia Medica, Therapeutics and
Diseases of the Throat and Nose

ALBERT VANDER VEER, M. D., PH. D., LL. D.
Professor of Surgery

SAMUEL BALDWIN WARD, M. D., PH. D.
Dean
Professor of Theory and Practice of Medicine

JAMES PETER BOYD, M. D.
Professor of Obstetrics and Diseases of Children

WILLIS GAYLORD TUCKER, M. D., PH. D.
Registrar
Professor of Chemistry and Toxicology

CYRUS STRONG MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC COLTON CURTIS, M. D.
Professor of Dermatology

HENRY HUN, M. D.
Professor of Diseases of the Nervous System

SAMUEL ROSEBURGH MORROW, M. D.
Professor of Practice of Surgery and of Orthopedic Surgery

HERMON CAMP GORDINIER, M. D.
Professor of Physiology

HOWARD VAN RENSSELAER, M. D.
Professor of Materia Medica and Therapeutics, and Adjunct
Professor of Theory and Practice of Medicine

JOSEPH DAVIS CRAIG, M. D.
Professor of Anatomy and Curator of the Museum

ANDREW MACFARLANE, M. D.
Professor of Physical Diagnosis and of Medical Jurisprudence

*Died August 25, 1913.

ARTHUR GUERNSEY ROOT, M. D.
Professor of Diseases of the Throat and Nose

LEO HAENDEL NEUMAN, M. D.
Professor of Gastro-Enteric Diseases, and Clinical Professor of
Theory and Practice of Medicine

ARTHUR WELLS ELTING, M. D.
Professor of the Practice of Surgery and of Clinical Surgery

EDGAR ALBERT VANDER VEER, M. D.
Professor of Abdominal and Clinical Surgery

JOHN ALBERTSON SAMPSON, M. D.
Professor of Gynecology

HARRY SAUL BERNSTEIN, M. D.
Professor of Pathology and Bacteriology

HERMAN BENDELL, M. D.
Clinical Professor of Otology

JESSE MONTGOMERY MOSHER, M. D.
Clinical Professor of Insanity, Neurology and Electro-
Therapeutics

HARRY JUDSON LIPES, M. D.
Clinical Professor of Obstetrics

ARTHUR SAUTTER, M. D.
Clinical Professor of Dermatology and Venereal Diseases

GEORGE EMORY LOCHNER, M. D.
Clinical Professor of Obstetrics

CLEMENT FRANK THEISEN, M. D.
Clinical Professor of Diseases of Throat and Nose

HENRY LARNED KEITH SHAW, M. D.
Clinical Professor of Diseases of Children

SPENCER LYMAN DAWES, M. D.
Adjunct Professor of Materia Medica

LA SALLE ARCHAMBAULT, M. D.
Adjunct Professor of Neurology

ROBERT WOOD KEETON, M. S.
Adjunct Professor of Physiological Chemistry and Experimental
Physiology

WILLIAM OLIN STILLMAN, M. D.
Lecturer on History of Medicine

CHARLES HENRY MOORE, M. D.
Lecturer on Ophthalmology and Otology

JAMES FRANCIS ROONEY, M. D.
Lecturer on Hygiene, and Instructor in Medicine

HOWARD EATON LOMAX, M. D.
Lecturer on Anatomy and Demonstrator of Anatomy

GEORGE GUSTAVE LEMPE, M. D.
Lecturer on Minor Surgery

WILLIAM ATWOOD LARKIN, PH. G.
Assistant Registrar
Lecturer on Inorganic Chemistry and Instructor in Organic Chemistry

JAMES NEWELL VANDER VEER, M. D.
Lecturer on Surgical Technic and Instructor in Genito-Urinary Surgery

ARTHUR JOSEPH BEDELL, M. D.
Lecturer on Ophthalmology

JAMES WESLEY WILTSE, M. D.
Lecturer on Dermatology and Genito-Urinary Diseases

JOHN HENRY GUTMANN, M. D.
Lecturer on Surgery and Clinical Anaesthesia

JOSEPH LEWI DONHAUSER, M. D.
Lecturer on Surgical Diagnosis

ALVAH HARRY TRAVER, M. D.
Lecturer on Clinical Surgery and Instructor in Surgery

CLINTON BENJAMIN HAWN, M. D.
Lecturer on Clinical Microscopy

CLINTON PRESTON McCORD, M. D.
Lecturer on School Hygiene

JOHN McWILLIAMS BERRY, M. D.
Lecturer on Radiography

WARDNER DANIEL AYER, M. D.
Lecturer on Histology, Embryology, Bacteriology and Pathology

RALPH EMERSON MYERS, A. M.
Experimental Lecturer on Pharmacology and Physiological
Chemistry

WALTER CLAYTON FOX, M. D.
Lecturer on Histology, Pathological Anatomy and Bacteriology

CLARENCE EDMOND MULLENS, M. D.
Lecturer on Anatomy

EDGAR ROSCOE STILLMAN, M. D.
Instructor in Physiology

CHARLES KNICKERBACKER WINNE, JR., M. D.
Instructor in Theory and Practice

JOSEPH ALOYSIUS LANAHAN, M. D.
Instructor in Dermatology and Venereal Diseases

GEORGE EVERETT BEILBY, M. D.
Instructor in Surgical Pathology

BRANSEN KEEMPER DeVOE, M. D.
Instructor in Anatomy

EUGENE EUNSON HINMAN, M. D.
Instructor in Diseases of Throat and Nose

MALCOLM DOUGLAS, M. D.
Instructor in Physical Diagnosis and Therapeutics

ERASTUS CORNING, M. D.
Instructor in Theory and Practice, and Physical Diagnosis

LEROY SOLOMON BLATNER, D. D. S.
Instructor in Oral Pathology

WILLIAM KIRK, M. D.
Instructor in Anatomy and Physiology of the Nervous System

JEROME MEYERS, M. D.
Instructor in Physical Diagnosis and Gastro-Enteric Diseases

RICHARD ANDREW LAWRENCE, M. D.
Instructor in Obstetrics

THEOBALD FREDERICK DOESCHER, M. D.
Instructor in Gastro-Enteric Diseases

NELSON KAUFMAN FROMM, M. D.
Instructor in Materia Medica and Physical Diagnosis

TIFFANY LAWYER, M. D.
Instructor in Gynecology

EDWIN LYON DRAPER, M. D.
Instructor in Surgical Pathology and Surgery

WILLIAM GEORGE KEENS, M. D.
Instructor in Diseases of Throat and Nose

HARRY HOUGHTON DRAKE, M. D.
Instructor in Anatomy and Clinical Assistant

JOSEPH AMBROSE COX, M. D.
Instructor in Obstetrics

JOSEPH LEWI BENDELL, M. D.
Instructor in Surgery

FREDERICK CHARLES CONWAY, M. D.
Instructor in Physical Diagnosis

JOHN FORREST SOUTHWELL, M. D.
Instructor in Surgery

PAUL TOMPKINS HARPER, M. D.
Instructor in Obstetrics

THOMAS WILLIAMS JENKINS, M. D.
Assistant Instructor in Histology

CHARLES WILLIAM LOUIS HACKER, M. D.
Assistant Instructor in Histology and Pathology

ARTHUR HENRY STEIN, M. D.
Assistant Instructor in Pathology and Bacteriology

DAVIS BAKER, M. D.
Assistant Instructor in Histology

CHARLES FREDERICK MYERS, M. D.
Assistant Instructor in Physiological Chemistry and Experimental Physiology

Clinical Assistants

WILLIAM GRANT LEWIS, M. D.	PHILIP C. HACKER, M. D.
MARTIN MACHARG, M. D.	HIRAM B. RIGGS, M. D.
WILLIAM H. GEORGE, M. D.	WALTER S. LILIENTHAL, M. D.
LOUIS LEBRUN, M. D.	JOHN L. EDWARDS, M. D.
JAMES M. MOORE, M. D.	WESLEY M. ADAMS, M. D.
GEORGE S. MUNSON, M. D.	ELMER H. ORMSBY, M. D.
JOSEPH P. O'BRIEN, M. D.	JACOB DROOZ, M. D.
MILES A. McGRANE, M. D.	RUFUS BAKER CRAIN, M. D.
DANIEL V. O'LEARY, JR., M. D.	WALTER R. L. COAKLEY, M. D.
AGNES E. PAGE, M. D.	JOHN ROY WESTABY, M. D.
HARRY RULISON, M. D.	GEORGE V. GENZMER, M. D.
GEORGE W. PAPAN, JR., M. D.	MORRIS B. BEECROFT, M. D.
JOSEPH H. BOWERS, M. D.	BURKE DIEFENDORF, M. D.
LOUIS BURGH MOUNT, M. D.	CONRAD A. RISSBERGER, M. D.

CALENDAR

1913

Regular winter session begins.....Tuesday, September 23
 Election vacation.....Monday and Tuesday, November 3 and 4
 Thanksgiving vacation begins....Wednesday at 1 P. M., Nov. 26
 Lectures resumed.....Monday morning, December 1
 Christmas vacation begins....Wednesday morning, December 24

1914

Lectures resumed.....Monday morning, January 5
 Lincoln's birthday, lectures suspended...Thursday, February 12
 Washington's birthday, lectures suspended..Monday, February 23
 Commencement.....Tuesday, May 26

REQUIREMENTS FOR ADMISSION

All matriculates must secure 60 academic counts or their full equivalent, before beginning the first annual course counted toward the degree.

When all requirements are fulfilled, the regents issue a medical student certificate which the candidate must file with the registrar of the college.

Advanced Entrance Requirements in 1914-1915

Beginning with the session of 1914-1915 candidates for admission will be required to furnish evidence of one year's work in a college or scientific school in physics, biology, inorganic chemistry and a modern language. Union College provides a collegiate year embracing these subjects. (Pages 28, 32, 77.)

Preliminary Examination. The preliminary examination of medical students is under the control of the Board of Regents of the University of the State of New York. Those contemplating the study of medicine should apply to the Examinations Division, University of the State of New York, Albany, by letter or otherwise, if information concerning this examination further than that given in the catalogue of the Medical College is desired. One of the examinations will be held in Albany, January 19-23, 1914.

Mid-Winter Written Examinations in all the departments are held in January. A printed schedule of these examinations is furnished the class.

COURSE OF INSTRUCTION

The four-year graded course required of all candidates for the degree of Doctor of Medicine embraces the following subjects:

First Year

1. **Anatomy.** Four lectures; twelve hours dissection.
2. **Histology and Embryology.** Two lectures; four and a half hours laboratory.
3. **Inorganic Chemistry.** Five lectures; four hours laboratory.
4. **Organic Chemistry and Toxicology.** Six lectures.
5. **Physiology.** Two lectures; one recitation.

Second Year

1. **Physiology.** One lecture; one-half hour recitation; nine hours laboratory.
2. **Physiological Chemistry.** Three lectures; six and a half hours laboratory.
3. **Bacteriology.** Three lectures; nine hours laboratory.

4. **Pathology.** Three lectures; ten hours laboratory.
5. **Theory and Practice.** Two lectures; one recitation.
6. **Materia Medica.** Two lectures; one recitation.
7. **Surgery.** Two lectures and demonstrations.
8. **Anatomy.** Three lectures; two and a half hours laboratory (first term); one recitation.
9. **Experimental Pharmacology.** Two hours lecture and demonstration.
10. **Physical Diagnosis.** One hour exercise.

Third Year

1. **Theory and Practice.** Four lectures; two recitations; two clinics.
2. **Clinical Microscopy.** Two hours laboratory.
3. **Therapeutics and Electro-therapeutics.** Two lectures; one recitation.
4. **Obstetrics and Gynecology.** Three lectures.
5. **Pediatrics.** Two lectures; one recitation half the term.
6. **Neurology.** One lecture; one recitation half the term; one clinic.
7. **Surgery (including operative, fractures, dislocations).** Four lectures; one recitation; three hours clinics.
8. **Physical Diagnosis.** Section work two hours.
9. **Medical Jurisprudence.** One lecture half the term.
10. **Hygiene.** Two lectures.
11. **X Rays.** One demonstration half the term.
12. **Ophthalmology, Dermatology, Laryngology and Otology.** Two hours; clinical work in dispensaries, four hours.

Fourth Year

1. **Theory and Practice.** Two lectures; one recitation; three hours clinics.
2. **Neurology.** One lecture; one clinic.
3. **Gynecology.** One lecture half the term.
4. **Obstetrics.** Two and a half lectures.
5. **Surgery (including Orthopedics).** Four lectures; one recitation; three hours clinics.

6. **Specialties.** (In sections.) Seven hours; one recitation.

7. **Conferences.** One medical; one surgical.

8. **Clinical work.** (In groups.) Ten hours.

The order of instruction for the ensuing session will be found in the catalogue of the Medical College, and may be obtained by application to the registrar.

Laboratories

Analytical and Toxicological Chemistry

The chemical laboratory is well furnished, conveniently arranged and supplied with all necessary apparatus. The laboratory course is preceded by some lessons upon the essential principles of theoretical chemistry, including the laws of combination and valence, and these subjects are therefore more briefly treated in the regular lecture course. The practical laboratory work includes tests for those metals and acids, which, in combination, are important as constituents of medicinal compounds or as poisons, together with the separation of the chief groups, volumetric analysis, the examination of unknown substances and toxicology. All chemical reactions are written upon the blackboard, discussed by the class, and entered upon their notes.

Physiological Chemistry, Experimental Physiology and Experimental Pharmacology

The physiological chemistry has been placed in the first half of the second year, two afternoons per week from 12 P. M. until 5:30 P. M. are devoted to laboratory work, three hours to recitations and lectures. The laboratory is equipped with sufficient desks and apparatus to give the men opportunity for developing technique in chemical work.

The experiments cover the usual subjects, of constituents of protoplasm, tests for these, chemical mechanisms involved in digestion, absorption and metabolism. An attempt is made to have the students appreciate thoroughly the chemical facts lying back of the usual tests that he will have to apply. The metabol-

ism of the organism and its relation to diet are emphasized so that he will be in a measure prepared for the problems of pathological dietetics.

The work in experimental physiology is given during the second half of the second year at the Bender Laboratory. Three afternoons per week from 2 P. M. to 5. P. M. are devoted to it.

As the experiments are performed very largely on mammals it is necessary to divide the students into groups, and each group is responsible for the satisfactory completion of the assigned experiment. In order to economize time and effort, the group is so organized that a rotation of duties results. During one experiment a given member will be held responsible for the proper administration of the anaesthetic; in the next he will become surgeon, and at a third time he will handle the apparatus. In this way each man receives training in all the details of physiological work.

The experiments are planned with the end in view of giving the students a thorough grounding in the large problems of how the organism co-ordinates and integrates all the specific activities into a workable machine. The points at which this co-ordination is capable of being affected by drugs and other means are considered. The desire is present to give the men such a comprehensive grasp of the mechanism of physiological action that the sole and unthinking acceptance of therapeutic measures will be unnecessary. Finally such a course gives an opportunity for development of a technique in handling living issues that ought to be extremely helpful in future hospital training.

The course in experimental pharmacology consists of lectures, laboratory work, demonstrations and discussions. As presented, this course is very closely allied to experimental physiology. The nerve mechanisms and the normal processes taking place in the different organs or the body are first considered, followed by a study of the changes in these normal processes brought about by drugs. In this way the fundamental basis of the action of drugs is clearly demonstrated.

Anatomy

The dissecting and demonstration laboratories and the recitation rooms are well lighted and equipped and an ample supply of carefully prepared material is available. An endeavor is made to make the entire course in anatomy practical, consistent and useful, and to assist the student in laying a broad foundation of anatomical knowledge on which to build future courses in didactic and clinical medicine and surgery.

Histology, Embryology, Pathology, Bacteriology and Clinical Microscopy

Work in these departments is carried on in the Bender Hygienic Laboratory, on South Lake avenue, near the Albany Hospital.

This building was erected by the late Matthew W. Bender of Albany, and is thoroughly equipped with the apparatus necessary for the study of histology, pathology, bacteriology and clinical microscopy. Practical work in these branches is obligatory upon all students, and abundant opportunity is furnished in the laboratory for acquiring a thorough knowledge of these important subjects. An electric lantern which is adapted to the projection of pictures and microscopic preparations as well as lantern slides is used to supplement the more practical methods of demonstration.

Histology. The work consists of explanatory talks covering the subject of the day's study, followed by practical exercises in the laboratory.

Embryology. The star-fish egg is studied for early segmentation stages; gross and microscopic examination of a series of hen's eggs for formation of germ layers and development of the nervous and vascular systems. In a similar way the embryo of the pig is used for the development of the organs which is taken up again, according to the plan of Lewis, when each organ is studied histologically.

Bacteriology. The work consists of lectures followed by prac-

tical laboratory exercises. It is intended to render the student familiar with the underlying principles of bacteriology and their application to clinical medicine and surgery.

Pathology. The work consists of a short lecture on the subject under discussion for the day followed by practical exercises in pathological anatomy and histology. Besides this the students are instructed in the technique of making autopsies and examine material from autopsies and surgical operations. Demonstrations in experimental pathology are introduced whenever possible.

Clinical Microscopy. The course consists of preliminary talks followed by practical work in the examination of blood, urine, sputum, fæces, stomach contents, exudates, etc.; and includes a short course in clinical bacteriology.

Clinical Pathology. In this course histories of clinical cases are discussed. Pathological material bearing on these cases are given for gross and microscopic study.

In all these courses the student is taught independent methods of work and is required to keep a permanent record, illustrated by drawings, of all laboratory exercises.

A limited number of students who have shown proper aptitude are offered the opportunity to work along more advanced lines.

For the alumni of this school, and for the profession at large, this laboratory offers excellent facilities for bacteriological and pathological examination of specimens, and for the examination of urine, sputum, and blood, including the Wasserman-Noguchi reaction. Information regarding such examinations may be obtained by communicating with Dr. H. S. Bernstein, Director, Bender Laboratory, South Lake avenue, Albany.

Practical Clinical Courses

In order to familiarize students with the practical work of their profession, and to bring them into closer personal contact with patients, the fourth year class is divided into sections of eight or ten men, and on four days in each week each man devotes several hours to the examination and personal observation, under

the supervision of the instructors, of patients in the wards and out-patient departments of the various hospitals and dispensaries. In this clinical work special attention is devoted to the complete examination of the blood, urine, sputum and stomach contents, as well as to the special examination of the eye, ear and other organs. Thus in the course of the school year the men in each section acquire practical knowledge and technical diagnostic dexterity in general medicine, general surgery, gynecology, dermatology, neurology, insanity, otology, laryngology, ophthalmology, rhinology, diseases of children and infants, infant feeding, diseases of the rectum and genito-urinary tract, operative surgery, orthopedic surgery, clinical and operative obstetrics, electrotherapeutics and medical technic.

FEES AND EXPENSES

Fees, excepting the final examination fee, are payable each year in advance, are not returnable, and, for 1913-1914, are as given below. With the next session these fees will be increased.

First Year

Matriculation	\$5 00	
Lecture Course	100 00	
Chemical Laboratory	10 00	
Histological Laboratory	10 00	
Dissection (including material)	10 00	
		\$135 00

Second Year

Matriculation	\$5 00	
Lecture Course	100 00	
Bacteriology and Pathological Laboratory	20 00	
Physiological Chemistry and Experimental Physiology	15 00	
		\$140 00

Third Year

Matriculation	\$5 00	
Lecture Course	100 00	
Clinical Microscopy and Pathology	15 00	
		\$120 00

Fourth Year

Matriculation	\$5 00	
Lecture Course	100 00	
Final examination	25 00	
		\$130 00

In addition to the fees above stated, an annual charge of two dollars is made to members of the first, second and third year classes taking laboratory courses at the Bender Laboratory, for the use of microscopes and other apparatus. This fee is paid to the director at the laboratory, and after laboratory tickets have been issued by the registrar. For the laboratory work in physiological chemistry there is a fee of two dollars to cover use of apparatus and breakage payable to the director at the beginning of the session.

All fees are payable strictly in advance except that the final examination fee may be paid at any time before the examinations begin. Students from other colleges applying for admission to advanced standing will be required to pay the matriculation fee and also five dollars for each department in which they may be examined. Graduates of the school may attend lectures and stated clinics without charge except for matriculation in case of prolonged attendance.

The cost of living in Albany is less than in most other cities of its size. A list of boarding places, at which good rooms and board can be obtained at from four to five dollars a week or upwards, is kept by the janitor, and also at the Students' Club, and by clubbing together students can live comfortably at still lower rates. No estimate can well be made of cost of text-books and other personal expenses, since those of necessity vary greatly in different cases.

REQUIREMENTS FOR GRADUATION

The candidate must be twenty-one years of age, and exhibit a certificate from a physician or surgeon, duly authorized by law to practice his profession, that he has studied medicine and surgery under his instruction during the period required by law in this state, and he must present evidence of having complied with the law concerning preliminary examination.

He must have attended not less than four regular courses of lectures, of which the last shall have been at this college.

Students who have attended one or more courses of lectures at other registered medical colleges may be admitted to advanced standing in this college if they submit proper evidence of such attendance and a precise statement of subjects included in Examination Departments, as given in the Medical College Catalogue, in which satisfactory final examinations have been passed, and comply with the requirements stated under Examination Rules. No credit will be given for work done elsewhere in fourth year departments.

He must be of good moral character.

He must maintain a satisfactory standing during his course and pass a satisfactory final examination in the several branches taught.

Regular and punctual attendance is required, and matriculation tickets are endorsed with attendance at the end of the term.

For catalogues or further information, address

WILLIS G. TUCKER, M. D., *Registrar*,
Albany, New York.

ALBANY LAW SCHOOL

This school is among the oldest institutions of the kind in the country, having been established in 1851, and its graduates number many of the most successful men in the profession. It is and has been largely represented in the executive, judicial and legislative departments of this and many other states, as well as of the federal government. It became a part of Union University in 1873, and begins its sixty-third year as a law school with the present scholastic year. During its long and successful career it has, in common with other law schools, done much to demonstrate what was at one time doubtful, but is now accepted almost as an axiom, that a course at the law school is a well-nigh necessary prerequisite to a successful professional career. Its instructors have always been men of repute and standing, both for professional learning and personal character.

The local advantages of the city of Albany, as the seat of a professional school, can not be overrated. It is the capital of one of the leading states in the Union, whose legislature is in session here for the third part of the year, presenting opportunities not afforded by any other law school in the state for observing the methods and procedure collectively of the executive, judicial and legislative departments of the state government. The knowledge thus obtained by the students at law, who are to complete their course and to enter the realm of public affairs, can not be overestimated. It is easily accessible, remarkably healthful, and the scene of great business and professional activity. It is large enough to afford its inhabitants all the means of culture and recreation naturally to be looked for in a city, while it is not so large as to make the cost of living burdensome, even to persons of extremely limited means.

The facilities afforded the students for reading and study are unsurpassed. Besides the convenient and well chosen library of the school accessible to the students at all hours of the day and evening, the students have the privilege of using the state law library, which is now established in the New Education Building. With free access to these libraries the student may be relieved to a great extent from purchasing text-books.

TRUSTEES**President**

AMASA J. PARKER

Vice-President

SEYMOUR VAN SANTVOORD

Secretary

CHARLES J. BUCHANAN

Treasurer

A. PAGE SMITH

MARCUS T. HUN

ALTON B. PARKER

J. NEWTON FIERO

CHARLES C. LESTER

DANFORTH E. AINSWORTH

IRVING G. VANN

D. CADY HERRICK

THOMAS H. HUBBARD

JAMES F. TRACEY

FREDERICK W. CAMERON

CHARLES A. RICHMOND

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.

Chancellor of the University

J. NEWTON FIERO, LL. D.

Dean

Lecturer on the Law of Procedure, Equity, Torts, Evidence, Wills

LEWIS R. PARKER

Professor of the Law of Bailments, Bills and Notes, Guaranty
and Suretyship, and Constitutional Law

FLETCHER W. BATTERSHALL

Professor of Persons and Property, Domestic Relations, Partner-
ship

FRANK WHITE

Professor of the Law of Corporations

GEORGE LAWYER

Professor of the Law of Contracts, Personal Property and Sales,
Bankruptcy

FRANK B. GILBERT

Professor of the Law of Real Property, Statutes and Statutory
Construction

JACOB C. E. SCOTT
Professor of Criminal Law.

HON. D-CADY HERRICK
Municipal Corporations

FREDERICK W. CAMERON
Professor of the Law of Patents, Copyright, and Trade-Marks

CHARLES J. HERRICK
Professor of Civil Law, International Law, and Conflict of Laws

HON. IRVING G. VANN, LL. D.
Lecturer on Insurance

HON. ALDEN CHESTER
Lecturer on the Federal Judicial System

HON. WILLIAM P. RUDD
Medical Jurisprudence

FREDERICK D. COLSON
Lecturer on Books and Their Uses

JOHN C. WATSON
Registrar

Hubbard Chair of Legal Ethics. The circulars of seventy of the leading law schools of the country show that a very few years ago only twenty of this number made the subject of legal ethics part of the curriculum. With two exceptions, those schools were either in the west or south. These facts led Gen. Thos. H. Hubbard, class of '60, to place at the disposal of the board of trustees the sum of \$10,000, the income to be applied to lectures upon this subject. The board of trustees decided to inaugurate the course at the opening of the school year of 1903 and twenty-six Lectures by as many distinguished Judges and Lawyers have been delivered up to this time.

CALENDAR

1913

Registration, first semester.....Tuesday, September 23
Scholastic year begins.....Wednesday, September 24
Election day recess.....Friday, October 31
Lectures resumed.....Wednesday, November 5
Thanksgiving recess begins, noon.....Wednesday, November 26
Lectures resumed.....Tuesday, December 1
Holiday recess begins, noon.....Friday, December 24

1914

Lectures resumed	Monday, January 6
McKinley day.....	Thursday, January 29
Examinations.....	Thursday-Friday, January 29-30
Registration, second semester.....	Monday, February 2
Washington's birthday (Feb. 22).....	Saturday, February 21
Easter recess begins noon.....	Thursday, April 9
Lectures resumed.....	Monday, April 20
Memorial Day.....	Sunday, May 30
Examinations.	Thursday and Friday, June 4-5
Commencement.....	Thursday, June 11

REQUIREMENTS FOR ADMISSION AND GRADUATION

The course for graduation is now three years. Candidates for graduation from this school will be required (1) to present evidence of a general preliminary education representing at least four years, or their equivalent, of work of a grade above the elementary or grammar school before beginning the course of study; (2) to have studied law at least three full years for the degree of LL. B., each school year of which shall consist of not less than thirty-two school weeks, exclusive of vacations, in which not less than ten hours of attendance upon law lectures or recitations of such prescribed course to be given or conducted by regular members of the faculty are required in each week, unless admitted to advanced standing of one year on graduation from a registered college or university; (3) to complete the course in residence of not less than one year; (4) to be of good moral character; (5) to be at least twenty-one years of age.

EXPENSES

Matriculation fee, on entrance.....	\$10
Tuition, each year.....	110
Graduation fee	10

For catalogues or further information address

JOHN C. WATSON, *Registrar*

Albany Law School,

Albany, N. Y.

THE DUDLEY OBSERVATORY

The Dudley Observatory is located on Lake avenue, in the southwestern part of Albany, to which site it was removed in 1893 from its former location in the northern part of the city. It is devoted to original research in astronomy, according to the purpose of its founder and successive patrons. Its contributions to science are represented in two volumes of Annals and in other published volumes and memoirs contained in the transactions of learned societies and astronomical journals. Its principal line of work at present is the determination of problems relating to the positions and motions of the stars and of the solar system as a whole.

The instrumental equipment of the observatory is designed for the purposes of exact measurement in line with its chosen work. In the tower of the main building is the Pruyn equatorial, with object-glass twelve inches in diameter. This instrument is equipped both for visual and photographic use, and is of a high order of mechanical perfection. The Olcott meridian circle is located in a separate building, especially designed for securing the utmost equality in the temperature between the external air and that in the building itself. Its object-glass is eight inches in diameter. It was made by Pistor and Martins, of Berlin, and is regarded by astronomers as a masterpiece of accurate workmanship. This instrument has been employed for many years in obtaining the measurements necessary for the construction of the numerous and elaborate star catalogues which have issued from the Dudley Observatory. In addition to these instruments, the observatory is in possession of various small telescopes, clocks, chronographs and smaller apparatus.

The institution is supported by an endowment, chiefly contributed by Mrs. Blandina Dudley, the late Catharine W. Bruce, and Hon. Frederic P. Olcott, as well as by appropriations which have been received from the National Academy of Sciences, and from current contributions of trustees and friends of the institution. Since 1902, annual grants have been made to the director of the observatory by the Carnegie Institution of Washington. These have been sufficient to provide for the entire force of assistants and computers now employed. In 1905, the Carnegie Institution made special provision for carrying on the star researches upon which the observatory is engaged for a period of ten years. This includes an appropriation which enabled the observatory to send the Olcott meridian circle to the southern hemisphere for two years

with an ample force of observers, in order to carry out an essential feature of its investigations.

The Dudley Observatory is not designed to give general instruction in astronomy, though special students contemplating instruction in professional lines have been received from time to time under an arrangement of computing service to the observatory.

The observatory is opened to visitors on Tuesday evening of each week from 8 to 10 o'clock.

For further particulars apply to

BENJAMIN BOSS, Acting Director

TRUSTEES

President

SAMUEL B. WARD, M. D., PH. D.

Vice-President

WILLIAM H SAGE

Treasurer

DUDLEY OLCOTT

Secretary

BENJAMIN BOSS

CLARENCE RATHBONE
GRANGE SARD
J. TOWNSEND LANSING
HENRY HUN
GEORGE G. DAVIDSON
BENJAMIN W. ARNOLD

JAMES F. COOPER
OSCAR L. HASCY
WILLIAM G. RICE
ROBERT C. PRUYN
CHARLES A. RICHMOND

STAFF

BENJAMIN BOSS
Acting Director

Assistants

Nine Computers

ARTHUR J. ROY, C. E., A. M.
SEBASTIAN ALBRECHT, B. S., PH. D.
WILLIAM B. VARNUM, A. B.
HARRY RAYMOND, A. B.
SHERWOOD B. GRANT, C. E.
HENRY JENKINS, A. B.

ALBANY COLLEGE OF PHARMACY

The Albany College of Pharmacy was created by act of the board of governors of Union University, June 21, 1881, and constitutes the department of pharmacy of Union University. It was incorporated as the Albany College of Pharmacy, August 27, 1881. The college is centrally located at 43-45 Eagle street.

TRUSTEES

President

CHARLES NEWMAN

Vice-President

CHARLES GIBSON

Treasurer

JOHN M. BIGELOW

Secretary

ALFRED B. HUESTED

ExOfficio

WILLIS G. TUCKER

SAMUEL B. WARD

ARTHUR L. ANDREWS

EDWARD N. MCKINNEY

OTTO SCHOLZ

CHARLES A. RICHMOND

GUSTAVUS MICHAELIS

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
Chancellor of the University

WILLIS GAYLORD TUCKER, M. D., PH. D.
Dean

Professor of Chemistry and Toxicology

ALFRED BIRCH HUESTED, M. D., PH. G.

Secretary

Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.

Emeritus Professor of Pharmacy

GARRET VANDER VEER DILLENBACK, PH. G.

Associate Professor of Pharmacy

EDWIN CUNNINGHAM HUTMAN, PH. G.

Director of Pharmaceutical Laboratory

WILLIAM ATWOOD LARKIN, PH. G.

Adjunct Professor of Chemistry and Physics

SPENCER LYMAN DAWES, M. D.

Director of Microscopical Laboratory

JARED WATERBURY SCUDDER, A. M.

Instructor in Latin

WARREN LANSING BRADT, PH. G.

Lecturer on Pharmaceutical Jurisprudence

WILLIAM WALKER GIBSON, B. A., PH. G.

Instructor in Commercial Pharmacy

HARRY WHEELER BAKER, PH. G.

Instructor in Pharmacy and Chemistry

RICHARD BERCHMANS GRAY, M. D.

Assistant in Microscopical Laboratory

MANSEY TEMPLETON STONE, PH. G.

Instructor in Pharmacy and Mathematics

LE ROY GEORGE MATHEWS, PH. G.

Instructor in Physics

CALENDAR FOR 1913-1914

1913

Opening exercises.....Monday, October 6
Examinations to pass off conditions.....Monday, October 6
Christmas vacation, begins.....Monday, December 22

1914

Exercises resumed.....Monday, January 5
Commencement.....Tuesday, April 8

REQUIREMENTS FOR ADMISSION

All applicants for admission to regular standing in this college must be at least seventeen years of age, and will be required to present a Pharmacy Student Certificate issued by the New York State Education Department. The requirement for this certificate is the completion of the first year's course in a recognized high school or academy, or evidence of an equivalent education. Inquiries concerning this preliminary requirement may be addressed to the New York State Education Department, Albany, New York.

THE CURRICULUM

The curriculum of the college embraces:

Chemistry—Theoretical, general, pharmaceutical and analytical

Botany—Structural, systematic and analytical

Materia Medica and Pharmacognosy

Pharmacy—Theoretical and Practical

Microscopy—Theoretical and practical in its relation to pharmacy

Toxicology

Pharmaceutical Mathematics

Physics

Physiology

Latin

Pharmaceutical Jurisprudence

Commercial Pharmacy

GRADUATION

The diploma of this college confers the degree of Graduate in Pharmacy (Ph. G.). Applicants for this degree must have had the required preliminary education, be of good moral character, have attended two full courses in this college, or the last course in this college and the first in some other registered college of pharmacy; have passed satisfactory examinations and paid all fees as hereafter stated.

FEES FOR TUITION

EACH YEAR

Matriculation	\$5 00
Tuition.	85 00

SITUATIONS

Students desirous of obtaining employment while attending college will be assisted as far as possible in securing situations, but employment cannot be promised in advance, and places cannot be secured by correspondence. During the past several years the faculty has had a much larger number of openings offered for graduates to lucrative positions than it has been able to fill. The demand on the part of the employers for skilled assistants is steadily increasing, and a college diploma or license from an examining board is demanded by law of those who engage in the practice of pharmacy in most of the states and cities of the Union.

For separate catalogue giving more complete information address

ALFRED B. HUESTED, *Secretary*
43-45 Eagle street
Albany, N. Y.

ENROLLMENT, UNION UNIVERSITY, 1913-14

STUDENTS OF UNION COLLEGE

Abbreviations

c, A. B. course; *ls*, Ph. B. course; *s*, B. S. course; *e*, B. E. course in general engineering; *se*, B. E. course in sanitary engineering; *ee*, B. E. course in electrical engineering; N. S., North Section; M. S., Middle Section; S. S., South Section; N. C., North College; S. C., South College.

An asterisk (*) before a student's name indicates that he has not been advanced in standing with his class.

Candidates for the Degree of Master of Arts or Master of Science

Michael William Bray, A. B.....	<i>Churubusco</i>
Harold E. Blodgett, Ph. B.....	<i>Schenectady</i>
Samuel M. Cavert, A. B.....	<i>Ballston Spa</i>
John A. C. Callan, M. C. E.....	<i>Schenectady</i>
Frederick T. Dawson, Litt. B.....	<i>Union College</i>
George M. Elmendorf, Ph. B.....	<i>Herkimer</i>
Paul J. Hagar, A. B.....	<i>Tarrytown</i>
Edward F. Hennelly, A. B.....	<i>Schenectady</i>
Edward B. Irish, A. B.....	<i>Fultonville</i>
Arthur L. Maxon, A. B.....	<i>Union College</i>
Roy H. McCormack, A. B.....	<i>Cincinnati, O.</i>
Fred F. McGauley, B. S.....	<i>Schenectady</i>
Floyd Leslie Miller, Ph. B.....	<i>Schenectady</i>
Ross Williams Tiffany, B. S.....	<i>Newburgh</i>
Harry G. Van Deusen, A. B.....	<i>Sayre, Pa.</i>
Charles N. Waldron, B. S.....	<i>Union College</i>
Otto J. Walrath, B. S.....	<i>Bloomfield, N. J.</i>
Kenneth B. Walser, A. B.....	<i>New York City</i>

Candidates for the Degree of Master of Civil Engineering

Harold W. Baker, B. E.....*Oneida*
 Tulloch McC. Townsend, B. E.....*Schenectady*

Graduate Students in Civil Engineering

Charles T. Male, B. E.....*Schenectady*, Silliman Hall
 Candidate for the degree of Master of Civil Engineering
 Walter von Dohlen Tiedeman.....*Schenectady*, 511 Smith Street
 Candidate for the degree of Master of Civil Engineering

Graduate Students in Electrical Engineering

Olin J. Ferguson, M. E. E..*University of Nebraska*, Lincoln, Neb.
 Candidate for the degree of Doctor of Philosophy
 Wilbert A. Garrison, A. M....*Schenectady*, 99 Van Vranken Ave.
 Candidate for the degree of Doctor of Philosophy
 Morland King, M. E. E.....*Schenectady*, 16 University Place
 Candidate for the degree of Doctor of Philosophy
 Walter L. Upson, M. E. E.....*Schenectady*, 244 Parkwood Blvd.
 Candidate for the degree of Doctor of Philosophy
 Guy Baker, A. B.....*Schenectady*, 306 Lenox Road
 Candidate for the degree of Master of Science in Electrical Engineering
 Nicholas S. Diamant, A. B.....*Schenectady*, 128 Avenue B
 Candidate for the degree of Master of Science in Electrical Engineering
 Joseph P. Duncombe, M. E.....*Schenectady*, 6 No. College St.
 Candidate for the degree of Master of Science in Electrical Engineering
 Dent Ferrell, B. S. in E. E.*Schenectady*, 312 Lenox Road
 Candidate for the degree of Master of Science in Electrical Engineering
 C. Field Frank, M. E.....*Schenectady*, 143 Lafayette St.
 Candidate for the degree of Master of Science in Electrical Engineering
 Herbert K. Humphrey, B. S. in E. E. *Schenectady*, 123 Nott Terrace
 Candidate for the degree of Master of Science in Electrical Engineering
 G. Guy Jeter, B. S. in E. E.....*Schenectady*, 201 Seward Place
 Candidate for the degree of Master of Science in Electrical Engineering
 Everett S. Lee, B. S. in E. E.....*Schenectady*, 27 Seward Place
 Candidate for the degree of Electrical Engineer

- Richart H. Marvin, M. E.....*Schenectady*, Waverly Place
Candidate for the degree of Master of Science in Electrical Engineering
- Robert L. McNeal, B. S.....*Schenectady*, 4 Nott Terrace
Candidate for the degree of Master of Science in Electrical Engineering
- Shuso Kawado, R. T. U.....*Schenectady*, 41 Wendell Ave.
Candidate for the degree of Master of Science in Electrical Engineering
- Orin E. Shirley, B. S. in E. E.....*Schenectady*, 123 Nott Terrace
Candidate for the degree of Master of Science in Electrical Engineering
- Frank Short, M. E.....*Schenectady*, 143 Lafayette St.
Candidate for the degree of Master of Science in Electrical Engineering
- Robert M. Spurck, B. S. in E. E..*Schenectady*, 123 Nott Terrace
Candidate for the degree of Master of Science in Electrical Engineering
- Tsing T Woo, B. S. in E. E.....*Schenectady*, 618 Chapel St.
Candidate for the degree of Master of Science in Electrical Engineering
- Un Dee Hsu.....*Nangang University*, ... 10 Dean St.
Candidate for the degree of Master of Science in Electrical Engineering

Seniors, Class of 1914

- ee* Luiz Morato P. d'Almeida.....*Sao Paulo, Brazil*. ...M. S. S. C.
- ee* C. Harry Anderson.....*Olean*.....Pyramid Club
- *ee* James Vincent Baker.....*Port Chester*.....B Θ Π House
- se* Carlton M. Baldwin.....*Glens Falls*.....Pyramid Club
- e* Frank Dorn Barclay*Schenectady*.....29 Euclid Ave.
- m* Sidney William Bisgrove.....*Schenectady*.....1706 Union st.
- e* George Sumner Bradford.....*S. Gardner, Mass.*29 Chestnut St.
- e* Louis Chester Case.....*Guilderland*.....Ψ T House
- ls* William Lawrence Coté.....*Warrensburg*.....Δ Φ House
- ee* Leon Elisha Decker.....*South Fallsburg*....Θ Δ Φ House
- e* Sidney Ferdinand Dejonge....*Tompkinsville*.....K A Lodge
- ee* Louis du Bois De La Vergne...*Kingston*.....A Δ Φ House
- ee* Nicholas S. Diamantides.....*Constantinople*.. 128 A.venue A
- ee* Eli Sarkis Eghiayan.....*Beyrouth, Syria*.....N. S. N. C.
- e* Cyrus Bruce Elmore.....*Middletown*.....B Θ Π House
- s* Thomas Leland Ennis.....*Rotterdam Junction*.A Δ Φ House
- ee* Richard William Evans.....*Fergus Falls, Minn.*...X Ψ Lodge
- s* Harry Clarkson Ewens.....*Buffalo*.....A Δ Φ House

<i>ee</i>	Pedro Ferraz Netto.....	<i>Sao Paulo, Brazil.....</i>	$\Delta \Phi$ House
<i>se</i>	Eugene D. Filmer.....	<i>Gloversville.....</i>	Pyramid Club
<i>ee</i>	Ernest Allen Fox.....	<i>Gloversville.....</i>	B Θ Π House
<i>ee</i>	J. Gordon Gidley.....	<i>Johnstown.....</i>	$\Delta \Phi$ House
<i>se</i>	Harrison Gunning.....	<i>Freeport.....</i>	Ψ Υ House
<i>c</i>	Jerome D. Guthmann.....	<i>Schenectady...1195 Eastern Ave.</i>	
<i>ee</i>	Luther Alfred Hagar.....	<i>Plattsburgh.....</i>	B Θ Π House
<i>ee</i>	John Alden Hall.....	<i>Washington, D. C..7 Seward Pl.</i>	
<i>s</i>	Arthur Leopold Hawley.....	<i>Schenectady.58 Washington Ave.</i>	
<i>c</i>	Henry Herman Hitchcock.....	<i>Cambridge.....</i>	Δ Υ House
<i>s</i>	John Taylor Howell, Jr.....	<i>Newburgh.....</i>	X Ψ Lodge
<i>ee</i>	Bert M. Hubbard.....	<i>Sandy Hill.....</i>	Pyramid Club
<i>s</i>	Charles Albion Kenworthy.....	<i>Amsterdam.....</i>	Ψ Υ House
<i>e</i>	John Porter Lacey.....	<i>Highland.....</i>	Φ Δ Θ House
<i>e</i>	George Edward Lewis, Jr.....	<i>Marion.....</i>	Φ Δ Θ House
<i>ee</i>	John Vrooman Lewis.....	<i>Schenectady....</i>	.4 Nott Terrace
<i>e</i>	Arthur Loeb	<i>New York City...223 Seward Pl.</i>	
<i>*ls</i>	Victor Alexander Lord.....	<i>Schenectady..2 Brandywine Ave.</i>	
<i>e</i>	George William Lutz.....	<i>Schenectady...914 Delamont Ave.</i>	
<i>ee</i>	Albert Horace Marcott.....	<i>Randolph, Vt.</i>	Θ Δ Φ House
<i>e</i>	Andrew Stanton McCormick....	<i>Boonville.....</i>	Pyramid Club
<i>s</i>	Alfred Cluett Meneely.....	<i>Watervliet.....</i>	A Δ Φ House
<i>ee</i>	Domingos Luciros de Moraes....	<i>Sao Paulo, Brazil.707 South Ave.</i>	
<i>*ee</i>	Ralph D. Morgan.....	<i>Buffalo.....</i>	104 Parkwood Blvd.
<i>s</i>	William Alvin Mudge.....	<i>Schenectady.....</i>	233 Liberty St.
<i>e</i>	Harry Froass Naumann.....	<i>Oneida.....</i>	Ψ Υ House
<i>s</i>	Dalton Vane Sarvey.....	<i>Elmira.....</i>	Ψ Υ House
<i>s</i>	Morris P. Schaffer.....	<i>Schenectady...924 Delamont Ave.</i>	
<i>ee</i>	LeRoy Sand Schell, Jr.....	<i>Schenectady.424 Brandywine Ave.</i>	
<i>m</i>	John Sherburne, 2nd.....	<i>Amsterdam.</i>	Albany
<i>s</i>	Arthur Daniel Sherman.....	<i>Albany.....</i>	North Colonnade
<i>*s</i>	Charles Sherman	<i>Albany.....</i>	K A Lodge
<i>ee</i>	Walter Curtis Smith.....	<i>Lynchburg, Va.....</i>	Pyramid Club
<i>e</i>	Stephen Bond Story.....	<i>Vernon, Conn.....</i>	Ψ Υ House
<i>e</i>	William Royal Taylor.....	<i>Schenectady....</i>	110 Nott Terrace
<i>se</i>	Archibald Scott Telfer.....	<i>Hartwick.....</i>	Φ Δ Θ House
<i>e</i>	Homer Michael Tinklepaugh....	<i>Sodus.....</i>	Φ Δ Θ House
<i>c</i>	George Octavius Truex.....	<i>Bolton Landing.....</i>	Θ Δ Φ House

c	Raymond Van Santvoord.....	Cohoes.....	Ψ	τ	House
s	Warren Chase Vosburgh.....	Voorheesville.....	Θ	Λ	Φ House
ee	George Wadsworth	Buffalo.....	A	Δ	Φ House
ee	Stanley Lincoln Walworth.....	Binghamton.....	A	Δ	Φ House
ee	James Robert West.....	Sodus.....	Φ	Δ	Θ House
s	Morgan L. Williams.....	Medway.....	5		Gillespie St.

Seniors—62.

Juniors, Class of 1915

c	Karl Engle Agan.....	Warrensburg.....	Δ	τ	House
ee	Raymond Barteau Arthur.....	Brooklyn.....	Θ	Λ	Φ House
c	Harry Floyd Bain.....	Argyle.....			Pyramid Club
s	Walter C. Baker.....	Oneida.....	Ψ	τ	House
ee	Wesley Hinson Baldy.....	Buffalo.....	Δ	τ	House
s	David John Beaver.....	Schenectady....	310		Victory Ave.
s	Jacob Julius Beaver.....	Schenectady....	310		Victory Ave.
s	Raymond Stewart Blodgett.....	Jefferson.....			Pyramid Club
e	Ralph Emmons Boyce.....	Nassau.....	Θ	Λ	Φ House
ee	Charles Valentine Brewster....	Scotia.....	R. F. D. No. 8,		Scotia
s	Maurice Robinson Brown.....	Amsterdam.....	514		Rugby Road
*ee	Urbano de Moraes Bueno, Jr....	Plotas, Brazil....	105		Seward Pl.
e	John H. Burwell, Jr.....	Saratoga.....	Φ	Γ	Δ House
s	Carl James Byron.....	Ilion.....	Φ	Γ	Δ House
*ee	Antonio F. de A. Cavalcanti....	Sao Paulo, Brazil....			Saratoga
ls	Ambrose M. Clark.....	Schenectady.....	12		Front St.
s	Prescott Coyle Cleveland.....	Jamaica.....	68		Union Ave.
c	Donald A. Coulter.....	Schenectady.....	3		Regent St.
e	Edward Peck Culver.....	Hudson Falls.....	Ψ	τ	House
ee	Fred Dales Cure.....	Pine Hill.....	Δ	τ	House
e	Harold John Delchamps.....	Mobile, Ala.....	X	Ψ	Lodge
*ls	Thomas Ashley Dent, Jr.....	Pelham Manor.....	A	Δ	Φ House
c	Robert Livingston Duane.....	New York City.....	Σ	Φ	Place
s	Henry Louis Faust.....	Schenectady.....	137		Clinton St.
ee	William John Fisher.....	Buffalo.....			Pyramid Club
c	James Leo Fitzgerald.....	Ilion.....	637		Terrace Place

e	Samuel Henry Frankel.....	Schenectady..	234½ So. Ferry St.
ee	Harold Duane Godfrey.....	Rosebank.....	K A Lodge
*e	John Jacob Guerard.....	Flat Rock, N. C.....	Δ Φ House
*s	George Streeter Hackney.....	Johnstown.....	Δ Φ House
ee	Howard Snow Hawn.....	Ravena.....	Φ Δ Θ House
ee	Lynde De Forest Hokerk.....	Gloversville.....	Δ T House
s	Ernest Baker Houghton.....	Schenectady.....	28 Swan St.
e	Horace Newton Hubbs.....	Geneva.....	A Δ Φ House
ee	Edward Richard Hughes.....	Schenectady..	25 Glenwood Blvd.
s	William Arthur Hughes.....	Schenectady..	25 Glenwood Blvd.
*s	Hazen Hunter	Florida.....	B Θ Π House
s	Thomas Philip Keating, Jr.....	Schenectady..	322 Germania Ave.
*c	Barlow Lingley Loomis.....	Unadilla.....	Pyramid Club
ls	Roger William Macmillan.....	Schenectady..	145 Glenwood Blvd.
e	Cornelius Mahaney.....	Fort Plain.....	Pyramid Club
e	William Hubert Mandeville.....	Elmira.....	Ψ T House
c	Austin Geddes Martin.....	Schenectady..	165 Englewood Ave.
ee	Harry Benjamin Marvin.....	New York City.....	Δ T House
ee	Edwin Asa Norton.....	Derry, N. H.....	821 Strong St.
*ee	Francisco de Salles Oliveira....	Sao Paulo, Brazil.....	S. C. S.
ee	David Benson Page, Jr.....	Oswego.....	Σ Φ Place
ee	Charles Howard Purdy.....	Downsville....	Θ Λ Φ House
ls	Frank Stanley Randles.....	Argyle.....	Pyramid Club
*ee	Orlando Ferreira da Rosa.....	Sao Paulo, Brazil.....	S. S. S. C.
e	John L. Scully.....	Schenectady.....	526 Liberty St.
ls	Earl J. Sharp.....	Altamont.....	Φ Δ Θ House
ee	Carlos Moreira da Silva.....	Estado de Rio, Brazil..	S. S. S. C.
ls	Frank Leander Smith.....	Morrison, Ill.....	X Ψ Lodge
s	Stanley Maynard Smith.....	Herkimer.....	Ψ T House
ls	Donald Arthur Starbuck.....	Gouverneur.....	B Θ Π House
e	David George R. Stoetzel..	Schenectady.....	407 Francis Ave.
e	John Edward Turgeon.....	Clayton.....	33 University Place
*ee	Gordon O. Vosburgh.....	Schenectady.....	9 State St.
s	William Winslow Wait.....	Schenectady.....	A Δ Φ House
ee	Gerrit Van Wagenen Wood....	Buffalo.....	Σ Φ Place
ee	Howard Lee Woods.....	Albion.....	Ψ T House

Sophomores, Class of 1916

s	Harlan Barrett Allen.....	Lowville.....	Θ Δ Φ	House
ls	Romeyn Treadwell Allen.....	Tarrytown.....	24	State St.
*e	Fred Leslie Anderson.....	Kellogg, Ida		Pyramid Club
*ls	Howard Alfred Arany.....	Schenectady.....	858	Emmett St.
e	Walter Ransom Gale Baker.....	Schenectady.....	108	Park Place
e	Lucius Eugene Baldauf.....	Eden.		Pyramid Club
e	Richard Berger, Jr.....	New York City.. . . .	Σ Φ	Place
s	Frank Stanton Bogaskie.....	Johnstown.....	Δ Φ	House
e	Albert Ralph Boomhower.....	Plattsburg.....	Ψ Υ	House
ls	Charles Foster Brown.....	Schenectady.....	K A	Lodge
e	Meade Cook Brunet.....	Petersburg, Va.	Σ Φ	Place
e	James Sheldon Butler.....	St. Johnsville.....	Δ Υ	House
e	Walter Allen Churchill.....	Oswego.....	Σ Φ	Place
s	William Mansfield Clinnick.....	Schenectady.....	218	Lafayette St.
e	Peter J. M. Clute.....	Schenectady.....	801	Strong St.
e	William Stewart Cole.....	Scotia.....	26	Eagle St., Scotia
*e	Rodrigo M. de B. Conceição....	Sao Paulo, Brazil.	24	Union Ave.
*ls	Kenneth Creble	Feura Bush.....	Θ Δ Φ	House
e	Carl Frederick Danner.....	East Aurora.....	B Θ Π	House
*s	William Wallace Darrow.....	Chatham.....	Δ Υ	House
c	Mulford David De Forest.....	Schenectady....	447	McClellan St.
e	George Edward De Rouville....	Albany.....	Δ Υ	House
e	Harry Clifford Dikeman.....	Freeport.....	Ψ Υ	House
e	Lloyd Elmer Dunkelberger.....	Lockport.....	Θ Δ Φ	House
*e	Leslie Franklin Edgerton.....	Hartsdale.....	Σ Φ	Place
s	Revington Lyman Embree.....	Stamford, Conn.....	Δ Υ	House
e	James Harold England.....	Albany.....	B Θ Π	House
e	Donald Alexander Ennis.....	Scotia...312		Mohawk Ave., Scotia
*e	Santiago Escalante	Scotia.....	4	Lincoln St., Scotia
e	Nathaniel Augustus Finch.....	Buffalo.....	A Δ Φ	House
e	August Flam	Schenectady.....	501	Crane St.
e	John Flam	Schenectady.....	501	Crane St.
c	Lee Chase Fletcher.....	Gillett, Pa.....	Ψ Υ	House
e	Walter Franck	Schenectady.....	831	Grant Ave.
s	Harold Brooks Gardner.....	Meadowdale.....	X Ψ	Lodge
e	Everett Edward Garrison.....	Yonkers.....	A Δ Φ	House

- **e* Hyatt Masten Garrison..... *Yonkers*..... A Δ Φ House
e Howard Allen Glenn..... *Scotia*..... 221 Catherine St.
e Clarence Elmer Glindmyer..... *Scotia*..... R. F. D. No. 8, Scotia
c William Carroll Gunning..... *Freeport*..... Ψ Υ House
s George Fulford Hanson..... *Schenectady*..... A Δ Φ House
ls Kenneth Boardman Hanson..... *Amsterdam*..... A Δ Φ House
**s* Paul Alfred Hauenstein..... *Buffalo*..... A Δ Φ House
e Arnold Hooper *Albany*..... X Ψ Lodge
e Joseph Howard-Soler *New York City*..... Ψ Υ House
e Albert Ingalls Howd..... *Schenectady*..... 22 Bedford Road
s Eugene J. Hummer..... *Ravena*..... 4 Lincoln St., Scotia
ls John Wagner Jackson..... *Fort Plain*..... Φ Γ Δ House
c Avrom Myer Jacobs..... *Albany*. North Colonnade
s Carl Burt Jenkins..... *Schenectady*.... 218 Second Ave.
s Herbert John Kauth..... *Buffalo*..... P. C.
e Daniel Jerome Keleher..... *Port Chester*..... N. S. N. C.
c Milton De Forest Ketchum..... *Wynantskill*..... Φ Γ Δ House
e Harry Russell Kirkup..... *Bay Shore*..... K A Lodge
e James Taylor Landreth..... *Schenectady*. College Hill
e Harold Miller Lewis..... *Geneva* M. S. S. C.
e William Cahill Loughlin..... *Fort Edward*..... Φ Γ Δ House
s Cornelius D. Lowell..... *Mt. Clemens, Mich.* A Δ Φ House
**e* Philip Tage Mallen..... *Chicago, Ill.*..... X Ψ Lodge
e Henry Floryan Macinkiewicz... *Schenectady*.... 218 Seward Place
e James Mauro *Gloversville*. Pyramid Club
e George Glenn Mercer..... *Schuyler Lake*..... 256 State St.
e Ralph Merton Mixter..... *Warren*..... N. S. N. C.
e Millard Harold Moulds..... *Selkirk*..... 109 Front St.
e Raymond Arthur Newton..... *Sidney*..... Δ Υ House
s Russell Ainslee Orr..... *Schenectady*..... 72 Union Ave.
s Barron Peck Reed..... *New York City*... Pyramid Club
e José de Assis Ribeiro..... *Sao Paulo, Brazil*..... S. S. S. C.
e William Alfred Robinson..... *Van Etten*..... Pyramid Club
ls Raymond Howard Rollins..... *Round Lake*..... 503 Lenox Road
e Howard Britton Santee..... *Williamson*..... Φ Δ Θ House
e Merrill Augustus Sauerbrei.... *Corinth*..... Pyramid Club
e Robert Thomas Scully..... *Schenectady*..... 52 Liberty St.

<i>e</i>	Carlton Newell Smith.....	<i>Schenectady</i>	332 Summit Ave.
<i>e</i>	José Cuba de Souza.....	<i>Sao Paulo, Brazil</i>	S. S. S. C.
* <i>e</i>	Benjamin Spraragen	<i>Warwick</i>	827 Albany St.
<i>e</i>	William Spraragen	<i>Warwick</i>	827 Albany St.
<i>c</i>	Milton Hymes Sternfeld.....	<i>Albany</i>	North Colonnade
* <i>e</i>	Glenn Ridgeway Stevens.....	<i>Newark</i>	B Θ Π House
<i>s</i>	Karl Montgomery Stoller.....	<i>Schenectady</i>	College Hill
<i>s</i>	Leon Blanchard Streeter.....	<i>Lake George</i>	Θ Λ Φ House
<i>s</i>	Guy Joseph Tanzer.....	<i>Amsterdam</i>	Pyramid Club
<i>c</i>	James Barker Taylor.....	<i>Greenville</i>	759 Nott St.
<i>c</i>	Richard Erastus Taylor.....	<i>Greenville</i>	759 Nott St.
<i>e</i>	Charles Van Orden Terwilliger.	<i>Albany</i>	125 Avenue B
<i>e</i>	Xenophon D. Theocharides....	<i>Marsovan, Turkey</i> ...	N. S. N. C.
<i>e</i>	Leon Edward Turpit.....	<i>Elnora</i>	118 Glenwood Blvd.
<i>e</i>	Paul C. Van Deusen.....	<i>Cooperstown</i>	Φ Δ Θ House
<i>s</i>	Leland Russell Van Wert.....	<i>Melrose</i>	Pyramid Club
<i>e</i>	John Henry Vought, 2nd.....	<i>East Aurora</i>	Σ Φ Place
<i>s</i>	Schuyler Vroman	<i>Middleburgh</i>	Δ Φ House
<i>e</i>	John Raymond Walsh.....	<i>Westfield, N. J.</i> ...	Pyramid Club
<i>e</i>	Horatio Woolever	<i>Herkimer</i>	23 Linden St.
<i>e</i>	Walter Elsworth Wynne.....	<i>Albany</i>	S. S. S. C.
<i>s</i>	Horace Zimmer.....	<i>Gloversville</i>	Δ Φ House

Sophomores—95.

Freshmen, Class of 1917

<i>e</i>	Arthur Amaya	<i>Bogota, Col., S. A.</i>	201 Seward Pl.
<i>s</i>	Charles Pattson Andrews.....	<i>Saratoga</i>	Δ Υ House
<i>e</i>	Merritt Woorward Atwood....	<i>Watertown</i>	X Ψ Lodge
<i>e</i>	Henry Gustage Bahret.....	<i>Poughkeepsie</i>	Δ Υ House
<i>s</i>	Kenneth Elwood Baird.....	<i>Schenectady</i>	177 Furman St.
<i>e</i>	J. Herbert Beck.....	<i>Southern Pines, N. C.</i>	Δ Φ House
<i>c</i>	Allison Sushobz Behr.....	<i>Amsterdam</i>	1206 Union St.
<i>e</i>	Kenneth Spooner Blakeslee....	<i>Glens Falls</i>	718 State St.
<i>e</i>	Julio Blandy	<i>Sao Paulo, Brazil</i> .	No. Colonnade
<i>s</i>	Freeman Rensselaer Boice.....	<i>Madalin</i>	27 Seward Pl.
<i>e</i>	Aurelio Laurinto Borelli.....	<i>Campinas, Brazil</i> ..	620 Liberty St.
<i>s</i>	Frank Joseph Boyle.....	<i>Ticonderoga</i>	105 Seward Pl.

e	Edward Winchester Bradford...	<i>So. Gardner, Mass.</i>	Pyramid Club
e	Richard Dale Braman.....	<i>Port Chester.....</i>	1319 State St.
e	Danaso de Souza Brandao.....	<i>Santos, Brazil.....</i>	P. O. Box 468
e	Edward Carpenter Brandow....	<i>Albany.....</i>	Δ Υ House
e	James Herschel Bresee.....	<i>Gloversville.</i>	Pyramid Club
e	Robert Fosgate Brundage.....	<i>Port Chester.....</i>	Δ Υ House
c	Joseph Clark Buchanan.....	<i>Chambersburg, Pa....</i>	Δ Υ House
s	Irwin Alfred Buell.....	<i>Northampton.....</i>	977 Albany St.
e	Clarence Jerome Bull.....	<i>Mamaroneck.....</i>	635 Chapel St.
e	Justin William Carr.....	<i>Astoria.....</i>	N. S. N. C.
ls	David Ferdinand Chapman....	<i>Broadalbin.....</i>	Δ Φ House
s	Robert Henry Clapp.....	<i>Fairport.....</i>	201 Seward Pl.
s	Arnold Vincent Cleary.....	<i>East'h'pton, Mass.</i>	105 Seward Pl.
e	Isaac William Clements.....	<i>Fort Ann.....</i>	No. Colonnade
c	Wilson Ober Clough.....	<i>Woodstock.....</i>	6 Furman St.
s	Vernon Gifford Clute.....	<i>Scotia.....</i>	Δ Υ House
ls	Alan Stevens Cobden.....	<i>Troy.....</i>	K A Lodge
s	Daniel Black Coleman.....	<i>Belchertown, Mass..</i>	711 Nott St.
e	Alva Henry Colson.....	<i>Geneseo.....</i>	K A Lodge
e	Allen Charles Cooley.....	<i>Schenectady....</i>	404 Summit Ave.
s	Donald Jay Coon.....	<i>Fairport.....</i>	201 Seward Pl.
e	Nelson Coon	<i>Rhinebeck.....</i>	Φ Γ Δ House
s	Thomas Joseph Corbett.....	<i>Schenectady....</i>	1025 Albany St.
e	Humberto Monteiro da Cunha..	<i>Sao Paulo, Brazil.</i>	211 Seward Pl.
s	Ralph Smith Dewey.....	<i>Ripley.....</i>	26 Park Pl.
e	Harry Hurlburt Dibble.....	<i>Ushers.....</i>	45 Front St.
s	Robert Sweetland Douglas.....	<i>Binghamton.....</i>	Σ Φ Place
s	Ralph Windser Downs.....	<i>Omaha, Neb.....</i>	X Ψ Lodge
c	Harold Leo Dunn.....	<i>Schenectady....</i>	340 Summit Ave.
e	Floyd Field Eldred.....	<i>Auburn.....</i>	Ψ Υ House
s	Frank Russell Elmore.....	<i>Middletown.....</i>	864 Union St.
e	Anson Ainsworth Emmerling..	<i>Albany...11</i>	Elberon Pl., Albany
e	Wendel George Fallis.....	<i>Gloversville.</i>	Pyramid Club
e	Franklin Lee Fero.....	<i>Fultonville.....</i>	705 Nott St.
s	Edward David Fitz Gerald....	<i>Hudson.....</i>	324 Parkwood Blvd.
e	Lewis Milmine Fox.....	<i>Schenectady.....</i>	115 Irving St.
ls	Jacob Mitchell Frankel.....	<i>Schenectady..</i>	234½ So. Ferry St.

e	Willet William Friday.....	Schenectady..25	Parkwood Blvd.
e	George Rae Galbraith.....	Rochester.....	Φ Γ Δ House
ls	Jacob William Gauger.....	Albany.....	Δ Φ House
ls	William Morris Gilbert, Jr.....	Yonkers.....	Ψ Τ House
c	Wallace Sedgwick Girling.....	Jamaica.....	Ψ Τ House
e	Arnold Herbert Goodman.....	Albion.	Pyramid Club
e	Henry Simmons Hadley.....	New York City.....	X Ψ Lodge
ls	Arthur Clifford Kimber Hallock.	Schenectady.....	6 Gillespie St.
e	Mortimer Thomas Harvey.....	Ticonderoga.....	105 Seward Pl.
s	Joseph Edward Haubner.....	Schenectady.....	1031 State St.
s	Albert Edward Hawn.....	Albany.....	Φ Δ Θ House
s	Orra Frost Hawn.....	Ravena.....	Φ Δ Θ House
e	Charles Manser Hendry.....	Rye.....	143½ Barrett St.
e	Delos Seelye Hickok.....	Buffalo.....	115 Nott Terrace
e	Henry Walter Hochuli.....	Schenectady.....	1471 State St.
e	Perry Edward Hoffman.....	Hancock.	North Colonnade
s	Earl Myron Hyatt.....	Newburgh.....	115½ Clinton St.
ls	John Hulbert Imrie.....	Lake George.....	Δ Φ House
e	Merwyn James Jamieson.....	Stark.....	B Θ Π House
e	Anthony John Janulis.....	Amsterdam.....	N. S. N. C.
e	Elliott Vedder Jones.....	Amsterdam.....	Φ Γ Δ House
s	Emaris Lester Jones, Jr.....	Waterliet.1567	First Av., Wa'v't
e	Herman Lynn Kertscher.....	Elmira.....	Ψ Τ House
e	Earle Gidley Kniffen.....	Schenectady.....	213 Seward Pl.
s	Herbert Ralph Knight.....	Glens Falls..100	Glenwood Blvd.
ls	John Albert Kosinski.....	Amsterdam.....	870 Eastern Ave.
s	Chaim Srolew Kuperman.....	New Brighton.....	426 Avenue A
e	Herbert Lasher	Tivoli.....	27 Seward Pl.
e	Frank Alexander Laskowski....	Schenectady.....	342 Bridge St.
e	Paul Dobinson Leake	Charleston, S. C.	Δ Φ House
s	Charles Tuck Lester.....	Saratoga.....	A Δ Φ House
s	Charles Albert Lewis.....	Troy.....	I Church St.
e	Joao Ernesto Lisboa.....	Sao Paulo, Brazil..841	Union St.
e	Rufus Victor Maier.....	Schenectady.....	1318 State St.
e	Stephen Alexander Majewski...Schenectady.	III Van Guysl'g Av.	
s	Ernest Wyckoff Mandeville....	Elmira.....	Ψ Τ House
s	Louis Mann	New York City.....	Δ Τ House

s	Edwin Madison Martin.....	<i>Delanson.</i>	.....	Delanson
e	Allen Mattison	<i>South Berlin.</i>	.....	Θ Λ Φ House
s	John Francis McDermott.....	<i>Schenectady.</i>	.....	129 Park Pl.
e	Ashley Clinton Mead.....	<i>Scotia...</i>	22 Ballston Ave.,	Scotia
e	James Floyd Miller.....	<i>Albany.</i>	.....	B Θ Π House
s	John Morton Moore.....	<i>Northville.</i>	.....	300 Craig St.
s	Ralph Gleason Morison.....	<i>Little Britain.</i>	.....	Φ Δ Θ House
e	Raymond Everett Moses.....	<i>Binghamton.</i>	.....	22 Barrett St.
e	George Eldred Moston.....	<i>North Creek.</i>	.....	Φ Δ Θ House
e	Armando de Souza Mursa.....	<i>Sao Paulo, Brazil.</i>	123 Park Ave.	
e	Gordon Clifford Nash.....	<i>Mount Kisco.</i>	.....	No. Colonnade
s	Daniel John Naylor.....	<i>Schenectady.</i>	25 Washington Ave.	
e	Milton McCowan Newell.....	<i>El Paso, Texas.</i>	.....	711 Nott St.
ls	Kenneth Smith Noyes.....	<i>Lake George.</i>	.....	Δ Φ House
s	Charles Joseph O'Brien.....	<i>Fulton.</i>	.....	A Δ Φ House
s	Hugh Francis O'Neill.....	<i>Schenectady.</i>	.....	22½ Union Ave.
e	Hall Brainard Passage.....	<i>Schenectady.</i>	.....	244 McClellan St.
e	Carl Alden Peterson.....	<i>Schenectady.</i>	.....	220 Liberty St.
s	Fawcett William Porter.....	<i>Omaha, Neb.</i>	.....	X Ψ Lodge
e	Don P. Price.....	<i>Hancock.</i>	.....	104 Park Ave.
e	Herbert Spencer Roberts.....	<i>Scotia...</i>	38 Ballston Ave.,	Scotia
e	Dow Geesler Roof.....	<i>Canastota.</i>	.....	608 Union St.
e	Wilfred Masten Rosekrans.....	<i>Schenectady.</i>	.....	36 Wendell Ave.
ls	Albert Salisbury	<i>Deposit.</i>	.....	Pyramid Club
s	Harold Leonard Sammons.....	<i>Ogdensburg.</i>	.....	B Θ Π House
s	William Schauer	<i>Altoona, Pa.</i>	.....	515 Chrisler Ave.
e	James McPherson Schmidt....	<i>Hurley.</i>	.....	613 State St.
s	Francis William Schnitzlein....	<i>Fort Plain.</i>	.....	Pyramid Club
ls	Rudolph William Schwartz....	<i>Albany.</i>	.....	No. Colonnade
s	Hal Arch Scoby.....	<i>North Tonawanda.</i>	.....	B Θ Π House
e	James Kyle Sexson.....	<i>Franklin, Neb.</i>	17 Wash. R.,	Scotia
e	Jader Alves da Silva.....	<i>Rio de Janeiro, B.</i>	205 Seward Pl.	
ls	Francis Leatham Skau.....	<i>Schenectady.</i>	.....	416 Franklin St.
s	Alfred Jacob Snell.....	<i>St. Johnsville.</i>	.....	Δ T House
s	Homer L. Stephens.....	<i>Gardner.</i>	.....	331 Seward Pl.
e	Henry Gray Streeter.....	<i>Glens Falls.</i>	.....	Φ Γ Δ House
s	John Francis Taffe.....	<i>Rensselaer.</i>	1233 First St.,	Rens'l'r

<i>ls</i> David Marlin Taylor.....	<i>Lanesboro, Pa...</i>	115 Waverly Pl.
<i>e</i> Otto Christian Thuener.....	<i>Schenectady..</i>	R. F. D. 7, Schen'dy
<i>ls</i> Ralph Sylvester Travis.....	<i>Hale Eddy.....</i>	634 Rugby Road
<i>ls</i> John Hider Tregurtha.....	<i>Schenectady..</i>	37 Parkwood Blvd.
<i>e</i> Oliver Calvert Underhill.....	<i>Schenectady.....</i>	1458 State St.
<i>e</i> Cecil Harkey Underwood.....	<i>Schenectady....</i>	823 Lincoln Ave.
<i>s</i> Forest Baldwin Van Avery.....	<i>Schenectady.....</i>	3 Haigh Ave.
<i>e</i> Antonio dos Santos Vianna.....	<i>Rio de Janeiro, Brazil.</i>	N. S. N. C.
<i>e</i> Joao dos Santos Vianna.....	<i>Rio de Janeiro, Brazil.</i>	N. S. N. C.
<i>e</i> Edward Clifton Vrooman.....	<i>Schenectady.....</i>	207 Union St.
<i>e</i> Kenneth Johnson Waite.....	<i>Newburgh.....</i>	115½ Clinton St.
<i>s</i> George Hugh Wallace.....	<i>Port Jefferson.....</i>	705 Nott St.
<i>e</i> Leon J. Walrath.....	<i>St. Johnsville.....</i>	Δ T House
<i>e</i> Arnold Noble Weeks.....	<i>Ticonderoga.....</i>	Φ Γ Δ House
<i>s</i> William Barent Wemple.....	<i>Fultonville.....</i>	Σ Φ Place
<i>e</i> Samuel Noble Wheeler, Jr.....	<i>Hancock.....</i>	104 Park Ave.
<i>s</i> Hugh Jeremiah Williams.....	<i>Elmhurst, Pa...</i>	City Y. M. C. A.
<i>e</i> Andrew Douglas Wilson.....	<i>Schenectady.....</i>	313 Crane St.
Freshmen—141.		

Summary of Students, Union College

Candidates for the Master's Degree.....	20
Graduate Students	22
Seniors.	62
Juniors.	62
Sophomores.	95
Freshmen.	141
Total.	402

STUDENTS OF THE ALBANY MEDICAL COLLEGE

Fourth Year Class

John D. Arnett.....	Knowtsville
Abraham Ball	Brooklyn
David W. Beard.....	Cobleskill
Edward J. Buxbaum	Brooklyn
John P. Byrnes.....	Pittsfield, Mass.
Edward J. Callahan.....	Mechanicville
George C. Carter.....	Albany
Edward J. Costello	Brooklyn
John K. Crandall.....	Wappingers Falls
George J. Culver.....	Schenectady
Daniel S. Cunning.....	Troy
Frank E. Deeds.....	Schenectady
Nicholas A. Farello, A. B.....	Brooklyn
Albion J. Fitzgerald.....	Albany
Frank S. Fischhoff.....	Brooklyn
Frank Furlong	Highland
John W. Gard.....	Auburn
Clarence Gardinier	Schenectady
Parker A. Groff	Rome
Robert W. Helm.....	Saratoga Springs
John T. Hogan.....	Troy
William P. Howard.....	Albany
Edwin P. Huntington.....	Hopewell Junction
Lawrence Jacovius	New York City
George R. Jordan.....	New York City
Charles A. Joy.....	Springwater
Harry Vincent Judge.....	Albany
Joseph T. Laughlin	Brooklyn
Wilbur F. MacDonald.....	Schenectady
John S. McCormick, Ph. G.....	Albany
Thomas H. McGrail.....	Albany
Floyd G. Nellis.....	Boonville
Wilber Sylvester Newell.....	Syracuse
William O'Connor, B. S.....	Albany

Vincent J. T. O'Neill.....	Highland Falls
Harry Okun	New York City
Julius J. Padula.....	Albany
Harry D. Parkhurst.....	West Winfield
Charles A. Perry.....	Rome
Charles A. Rattner	New York City
Robert Reid, Jr.....	Schenectady
Charles A. Rendall	Richmond Hill
Harry S. Reynolds, B. S.....	Schenectady
Edward L. Robbins.....	Syracuse
Frank A. Searle.....	Southampton, Mass.
James I. Schoonmaker.....	West Coxsackie
Lewis J. Smith.....	Westfield, Mass.
Theron Smith	Newburgh
Leo R. Tighe.....	Cohoes
William I. Walsh.....	Troy
John Waluk.....	Amsterdam
Willard E. Wheelock.....	Canajoharie
Cecil C. Whittemore.....	Albany
Fred DeG. Wilson.....	Downsville
Leon Wolff	Brooklyn
Laurence R. Worrell.....	Greene
Harry T. Wygant.....	Watervliet
Fourth Year Class—57.	

Third Year Class

Julius R. Almer	New York City
Percy H. Austin.....	Warrensburg
Walter S. Bennett.....	Hartford
John E. Burke.....	Schenectady
Hugh S. Chidester.....	Saugerties
Samuel Colliss	New York City
Arthur H. Congdom.....	Fort Plain
Albert N. Crouch.....	Troy
Stephen H. Curtis.....	Troy
Gerald E. Dailey.....	Gloversville
Frank E. Dean, Jr.....	South Shaftsbury, Vt.

Irwin Van Olinda Decker.....	Troy
Arthur M. Dickinson.....	Albany
Francis T. Duffy.....	Troy
James M. Dunn.....	Schenectady
Lawrence J. Early.....	Schenectady
Frederick G. Eaton.....	Saratoga Springs
Guy Fish.....	Indian Lake
James W. Fitzgerald.....	Troy
Leon W. Green.....	East Springfield
William L. Grogan.....	Rome
Ralph M. Hall.....	Rensselaer
Raoul A. Hebert.....	Cohoes
Leon A. Heslin.....	Saratoga Springs
Stanley M. King.....	Urlton
James S. Lyons.....	Albany
William B. McKeon.....	Troy
Martin A. Murphy.....	Hoosick Falls
Joseph W. Miller.....	New York
William F. Nealon.....	Hoosick Falls
Charles L. Nichols.....	Philmont
John J. O'Connor.....	Albany
Jonathan Pearson, B. S.....	Schenectady
Joseph E. Randolph	Belleville
Theodore D. Reed.....	Albany
George S. Reitter.....	Stepney Depot, Conn.
Homer I. Rexford.....	Watervliet
Arthur G. Rogers, Jr.....	Rensselaer
William J. Ryan.....	Newport
Ernest R. Schilling.....	East Chatham
Frank P. Schneider.....	Utica
Benjamin H. Shapiro.....	Glens Falls
Byron G. Shults.....	Johnstown
Robert C. Simpson, Jr.....	Amsterdam
William P. Sweeny.....	Saratoga Springs
Charles W. Tomlinson.....	Lansingburg
Leonard Kip Van Dyck, A. B.....	Philmont
Herbert A. Vogel.....	Albany

Fred Vosburgh.....	Cobleskill
Archibald A. Walker.....	Callicoon
Bernath Weiss.....	Brooklyn
Joseph Wrana	Brooklyn
Third Year Class—52.	

Second Year Class

James L. Archbold	Cohoes
Harold A. Bancroft.....	Schenectady
Morgan O. Barrett.....	Plattsburgh
Glen Beecher	Grannatte
Louis A. Bellegarde.....	Albany
Jacob, Blumbog	Jersey City
Edward O. Boller.....	Elizabeth, N. J.
Thomas McG. Brennock.....	Albany
William C. Brons.....	Jamaica
James R. Cahill.....	Montgomery
William J. Carroll.....	Sag Harbor
Harold F. Cleveland, Ph. G.....	Salem
Lawrence H. Cotter.....	Poughkeepsie
Edward T. Delehanty	Albany
Richard P. Doody.....	Cohoes
Christie J. Drago	Brooklyn
Loyal L. Dunlop.....	Stony Creek
Henry H. Elwood, Jr.....	Corning
Harry G. Evens.....	Hadley
Patrick J. Fitzgibbons.....	Amsterdam
Glenn D. Frost.....	Van Hornesville
Karl Gebhard	Mt. Vernon
Victor Gioncontieri	Brooklyn
William Goldbrush	Brooklyn
John L. Hemstead, Ph. G.....	Waterford
Hyman Hershberg.....	Albany
Herbert T. Hewett.....	Minaville
Frederic W. Holcomb.....	Paleville
Howard C. Johnston.....	Horicon
Howard M. Kenyon.....	Albany

John C. Knapp.....	Philmont
Charles A. Krauss.....	Watervliet
Francis J. Lawler.....	Pulaski
Benjamin Lechner	New York City
Earl C. MacCordy.....	Amsterdam
Frank T. B. Maguire.....	Albany
Royal H. Mayhew.....	Whitesboro
John M. McCarty	Saratoga Springs
Edward L. McDermott, B. S.....	Schenectady
John W. McKeever.....	Newburgh
Donald E. McKenna.....	Brooklyn
Walter McShane	Troy
James M. Neary.....	Watervliet
Edward B. O'Keefe.....	Hadley
Matthew F. Olstein.....	Peekskill
Robert M. Palmer.....	Gloversville
Orla J. Park.....	Hudson Falls
Harold A. Peck.....	Albany
Ray E. Persons.....	Jewett
Donald D. Prentice.....	Pittsfield, Mass.
Abraham M. Rabiner	Albany
George M. Richard.....	Corning
Clarence F. Rinkle.....	Boonville
Lester E. Sanford	Albany
Leslie B. Seaport.....	Cohoes
Rudolph J. Shafer.....	Castleton
Vincent G. Smith.....	Central Bridge
Howard B. Swann	Chestertown
Harry K. Tebbutt, Jr.....	Albany
Wesley A. Van Deusen.....	St. Johnsville
Howard C. Van Keuren.....	Mongaup Valley
John J. Ward.....	Johnstown
Henry R. Washbon.....	Morris
Earl C. Waterbury.....	Campbell Hall
Theodore S. West.....	New York
Raeburn J. Wharton.....	Summit

Second Year Class—67.

First Year Class

Joseph M. Ahearn.....	Troy
Stanley E. Alderson.....	Mohawk
Charles P. Archanbeault.....	Brooklyn
Milton Aronowitz, B. S.....	Albany
David S. Bartkiss.....	New York City
Clarence W. Barth.....	Schaghticoke
Raymond G. Bell.....	Auburn
Claude H. Bentley.....	West Hebron
James W. Bernhard.....	Schenectady
Sidney W. Bisgrove.....	Schenectady
John G. Brush.....	Troy
Leroy J. Butler.....	Waterford
Anathol M. Breault.....	Cohoes
Hubert F. Carroll.....	Indian Lake
Byron E. Chapman.....	Broadalbin
Morris Cohen	Newburgh
Lewis S. Conrad.....	Arltown
Norman S. Cooper.....	Athens
Leon C. Cote.....	Lake George
Howard W. Davis.....	Schenectady
Walter G. Davison.....	North Creek
Louis J. De Russo.....	Albany
Walter J. Dillon.....	Watervliet
Albert H. Faber.....	Schenectady
William E. Gazeley.....	Albany
Howard J. Garlick.....	Fall River, Mass.
Carl C. Geannatte.....	New Haven, Conn.
Isaac Goldstein	New York City
Charles W. Green.....	Schenectady
Samuel W. Green.....	Brooklyn
Joseph T. Guffin.....	Schenectady
Harold C. Hairland.....	Hudson Falls
Albert L. Hayes.....	Hoosick Falls
David F. Hannon.....	Pittsfield, Mass.
Charles J. Higley.....	North Adams, Mass.

William E. Hickey.....	Indian Lake
John M. Hickox.....	Harpersville
William H. Houck.....	Philadelphia, Pa.
Milton J. Jacobson.....	Troy
Kent W. Jarvis.....	Delanson
Clement J. Jasoloski.....	Schenectady
Raymond F. Kirchner.....	Albany
Maximillian Koletenberry.....	Brooklyn
Lazarus Lipschitz.....	New York City
Charles Mester.....	New York City
Joseph Motler	Brooklyn
George Y. Meyers.....	Albany
Robert A. McTaggart.....	Schenectady
Victor J. Mallet.....	Troy
Andrew V. Mullen, A. B.....	Poughkeepsie
William Panitch	Brainard
Anthony Penodla	Brooklyn
Barney W. Phillips	Hartwick
George T. Polk, Jr.....	Poughkeepsie
John J. Randall	Albany
Jacob Reswick	New York City
Leonard W. Ripton	Johnstown
John H. Robbins, Ph. G.....	Albany
John H. Robertson.....	South Glens Falls
Jouida T. San Loucie.....	Adams, Mass
Avery H. Sarno.....	Amsterdam
Ivan M. Schneible.....	Albany
Norman L. Sheeke.....	Dunkirk
Edward A. Sheeman.....	Watervliet
Nathan Sesitzky.....	New York City
David C. Shinanran.....	Troy
John Sherbourne	Amsterdam
Harold M. Smith.....	Colton
Patrick H. Smithington.....	Mechanicville
George E. Smith.....	Troy
John N. Stirbey.....	Troy
George M. Thomas.....	Adams Centre

Homer A. Tissier.....	Cohoes
Ralph W. Turner.....	Albany
Chester B. Van Gaasbeek.....	Kingston
Irving Van Woert.....	Albany
George C. Vogt.....	Kingston
Charles F. Walsh.....	Watervliet
Frank W. A. Wehle.....	Rochester
Burchard A. Winne.....	Hancock
Earl W. Wilkins.....	West Albany
First Year Class—81.	

Summary of Students, Albany Medical College

Fourth Year Students	57
Third Year Students	52
Second Year Students	67
First Year Students	81
Total.	257

STUDENTS OF THE ALBANY LAW SCHOOL

Graduate Students

Aaron Stanley Bliss, LL. B.....	Morrisville
Milton B. Ignatius.....	Troy

Third Year Class

Samuel E. Aronowitz (Dartmouth).....	Albany
Benjamin Axelroad	Albany
Pedro Baiges	Amasco, P. R.
Paul E. Brown.....	Unadilla
LeRoy G. Butler.....	Corinth
Samuel Caplan (State Normal).....	Albany
Horace B. Casey.....	Delmar
Walter L. Collins.....	Bath
John F. Delaney.....	Albany
Esther H. Goodstein.....	Albany
Robert G. Groves.....	Kingston
Leslie E. Hicks.....	Mechanicville
Fred Jeram	Newtonville
Bertram P. Kavanough.....	Troy
Bernard W. Kearney.....	Gloversville
James E. Kelly.....	Troy
Ralph Levy	Malone
Theodore B. Lull. (Colgate)	Edmeston
Joseph A. McGraw.....	Albany
Charles L. McMahon.....	Schuylerville
Leo D. Mahoney.....	Rochester
John J. Moy.....	Hudson
Catherine S. Murphy.....	Hudson
Charles F. Murray (Union).....	Albany
Daniel H. Myers (Yale).....	Albany
James A. Noonan.....	Lockport
Edward J. O'Connell (Union).....	Albany
Joseph P. O'Connell.....	Binghamton
Thaddeus S. Ogonowski.....	Schenectady
Dean Palmer (Syracuse).....	Syracuse

Charles J. Ranney (Holy Cross).....	Troy
Charles B. Rice.....	Waterford
Jacob Rubenstein	Rochester
Alfred I. Schimpf.....	Albany
S. Louis Schnitzer.....	Albany
Frank S. Sharp.....	Delmar
W. D. Smith (Harvard).....	Pulaski
Kathryn H. Starbuck (Vassar).....	Saratoga Springs
James Tracey Taaffe.....	Albany
Eugenio Vera	San German, P. R.
Melvin G. Vernon.....	Florida
Walter Wait	Corinth
Antonio G. Waldo.....	Canastota
Fred L. Webb.....	Salem
W. Chase Young.....	Hudson Falls
Third Year Class—45	

Second Year Class

E. Lee Allen.....	Richfield Springs
Francis Walter Bliss (Cornell).....	Middleburgh
Leo W. Begley.....	Schenectady
John H. M. Benson (State Normal).....	Troy
Stephen W. Brennan.....	Clinton
Francis E. Burns.....	Catskill
Lucien E. Clickner	Troy
Sidney B. Cooper (Syracuse).....	Watertown
Joseph P. Coyle.....	Wellsville
Ambrose V. Cunning.....	Troy
Hugh P. R. Dawson....	Schenevus
Henry H. Deane, Jr. (Vermont).....	Watertown
William H. DeKay, Jr.....	Hurleyville
Francesco DeLellis (Pittsburgh).....	Campobasso, Italy
Arthur C. Downing.....	Mechanicville
Irma D. Ellis.....	Albany
Warren S. Fales.....	Troy
Edwin C. Fellows.....	Newport
Holland R. Foster.....	Owego
Maurice Freedman	Albany

W. Earl Goodrich.....	Lansingburgh
James H. Gould (Union).....	Scotia
Patrick S. Guinnane.....	Jamestown
Lester J. Heath.....	Glens Falls
Lewis T. Hunt (Union).....	Albany
Charles T. Hurley.....	Seneca Falls
John M. Knapp.....	Hurleyville
Judson S. Landon (Yale).....	Schenectady
Myer J. Lavin.....	Albany
Acesta E. Lopez.....	San German, P. R.
Alexander H. Leamon (Union).....	Schenectady
Donald Cameron MacLean (Cornell).....	Cohoes
Allan B. Mann (Union).....	Schenectady
Arthur D. Mann (Union).....	Schenectady
Carroll E. Mealey.....	Valatie
William J. Meehan.....	Troy
Roy W. Peters (Union).....	Schenectady
Antonio Ponton.....	Camerio, P. R.
Byron H. Proper.....	Jefferson
Tobias E. Purcell (Denver).....	Corning
Jacob S. Rassin.....	Troy
Roy R. Richard.....	Plattsburg
Peter A. Rogers, Jr.....	Watervliet
Ogden J. Ross.....	Troy
Ralph L. Smith.....	Monticello
Charles T. Spencer.....	Ballston Spa
Charles A. Stone, Jr. (Wesleyan).....	Albany
John C. Welsh.....	Catskill
Willard A. White.....	Glens Falls
Harry F. Whiton.....	Troy
Leslie A. Wiggins.....	Rome
Earle John Wiley (Cornell).....	Troy
John Smith Woodward (Middlebury).....	Warrensburg
Second Year Class—53.	

First Year Class

Daniel V. Ahern.....	Binghamton
Paul L. Appleman.....	Troy

James A. Ball.....	Watervliet
Burnes F. Barford (Fordham).....	Valatie
Minnie Ida Bee.....	Schenectady
William Bentley	Albany
Rudolph J. Blais.....	Cohoes
Fletcher A. Blanchard.....	Albany
James Albert Bray.....	Churubusco
George Aden Brown.....	Clyde
Lilian Brockow	Albany
Morris E. Bumpus (Williams).....	Boston, Mass.
Charles Raymond Burton.....	Brookview
Bernard James Carney.....	Ballston Spa
James Francis Carroll (Williams).....	Troy
Henry A. Cohen.....	Albany
John J. Conners.....	Albany
Edward T. Corcoran.....	Mechanicville
Edward T. Coyle.....	Glens Falls
George Henry Cronin.....	Albany
Hugh I. Crum.....	Selkirk
George Warren Darrow.....	Saratoga Springs
Henry V. Delaney.....	Albany
James Bergen Dempsey (Catholic U. of Am.).....	Albany
Earl Leslie Dey.....	Freeville
John D. Dickson.....	Angelica
Julian B. Donehue.....	Whitehall
Leo M. Doody.....	Albany
Roscoe V. Elsworth.....	Port Ewen
Palmer W. Everts (Univ. of Vermont).....	Granville
Rocco M. Fischette.....	Clyde
Byron S. Fox.....	Rome
J. Howard Hahn (Hamilton).....	Albany
Leon N. Hamblin.....	Albany
Frederick Stanley Harris (Union).....	Peekskill
L. Victor Harrison.....	Johnstown
James Hayden	Troy
Henry R. Herman.....	Newburgh
John G. Hines.....	Albany

George B. Hurley.....	Warrensburgh
John J. Hyland.....	Pen Yan
Cornelius R. Johnson.....	Lansingburgh
Maurice Merton Katz.....	Schenectady
Ambrose J. Kelly.....	Mechanicville
John W. Kennedy.....	Troy
Harlan Kenyon	Troy
Edgar S. Knox.....	Albany
Paul Knox	Troy
John W. McConnell (Middlebury).....	Valatie
John S. McGrath.....	Watervliet
John Machado	Brazil
Archibald R. MacKennan.....	Poughkeepsie
Lawrence G. Magner.....	Schenectady
Stephen L. Mayham (Union).....	Schoharie
Henry Bacon Merritt.....	Gashen
Fay B. Moore.....	New York City
William N. Nicoll.....	Scotia
Timothy O'Conner	Boston, Mass.
William H. O'Neil.....	Albany
George Melvin Osgoodby.....	Baltimore, Md.
Charles A. Perrin.....	Glens Falls
Jose Ramon Quinones.....	Mayaguez, P. R.
William Riseley	Kingston
Henry J. Semo.....	Rome
Charles A. Sibbald (R. P. I.).....	Troy
Sherwood B. Speed (Colgate).....	Hudson
Forrest E. Stack.....	North Creek
Alfred H. Stamper.....	Albany
Franklyn J. Stowitts (Colgate).....	Albany
Howard E. Taylor.....	Binghamton
Ernest F. Tripp.....	Schenectady
Edward F. N. Utha.....	Coeymans
Hendrick W. Van Ness (Middlebury).....	Greenwich
Arthur C. Ward.....	Schenectady
Harold Gibson Wentworth.....	Albany
Alexander B. Wilkie.....	Selkirk
Cornelius J. Wood.....	Chatham

Summary of Students, Albany Law School

Graduate Students	2
Third Year Students	45
Second Year Students	53
First Year Students	77
Total.	177

STUDENTS OF THE ALBANY COLLEGE OF PHARMACY

Senior Class

Roy Abernethy	Madrid
David R. Ashton.....	Plattsburgh
Earl D. Bailie.....	Greenwich
Emanuel Brunt	Johnstown
James A. Byrne.....	Ballston Spa
George E. Conrad.....	Utica
Raymond C. Curtis.....	Saratoga Springs
Thomas F. Darmody.....	Salem
Raymond D. Darringer.....	Catskill
Alexander Deiches	Albany
Paul G. Dennis.....	Rensselaer
Warren E. Doll.....	Newburgh
Stanley J. Fischer.....	Oneonta
Norman J. Francis.....	Troy
Warren S. French.....	Albany
Paul A. Gallup.....	Stamford
Frank A. Galvin.....	Cohoes
Herman L. Grupe.....	Schenectady
Walter M. Hartman.....	Schenectady
John J. Healy, Jr.....	Troy
Cornelius J. Hector.....	Saranac Lake
Joseph W. Hunting.....	Albany
John L. Johnson, Jr.....	Lowville
Herbert Jones	Canajoharie
John E. Kelly.....	Little Falls
Charles H. Koon.....	Auburn
William R. Louckes.....	Dolgeville
Fred J. McGrath.....	Amsterdam
Rufus A. MacGregor.....	Delhi
John T. Macauley.....	Troy
George L. Mailloux.....	Watervliet
Ruth L. Marsh.....	Coxsackie
John E. Molloy.....	Schuylerville
Harry D. Naum.....	Nassau
John F. O'Leary.....	Albany

Herman R. Raphold.....	Castleton
Walter E. Rehm.....	Whitehall
Herbert E. Reynolds.....	North Chatham
Sayles C. Robinson.....	Troy
William J. Shea.....	Hoosick Falls
George H. Tilton.....	Waverley
Andrew Ulrich	Greene
Roland Vogel	Schenectady
Chester W. Weeks.....	Canajoharie
Marion C. Woodlock.....	Dalton, Mass.
Seniors—45.	

Juniors

Jack W. Abraham.....	Rutland, Vt.
Eugene M. Austin.....	Tupper Lake
William L. Barker.....	Elizabethtown, N. J.
William H. Barrett.....	Warwick
Mathilda M. Bongartz.....	Kingston
William J. Bhislin.....	Fort Edward
Harold P. Bronk.....	New Baltimore
Charles H. Burnett.....	Red Hook
Francis B. Casey.....	Proctor, Vt.
Thomas V. Conway.....	Canajoharie
Leo F. Carrigan.....	Danemora
Abner F. Dechant.....	Morristown
Daniel F. Doherty.....	Troy
Charles A. Edwards.....	Albany
Arthur V. Ellsworth.....	Glens Falls
Andrew C. Ericksen.....	Troy
Lester R. Finklestein.....	Albany
Ronald R. Fuhrer.....	Roscoe
Marion M. Gray.....	Rensselaer
John M. Green.....	Amsterdam
Robert Green	Sidney
Henry A. Haskins.....	Granville
Francis A. Healey.....	Troy
Ben. A. Hensler.....	Albany

Daisy M. Howard.....	Windham
Edson P. Howes.....	Albany
William D. Hyde.....	Waverley
Joseph Jablouski	Amsterdam
Patrick E. Kiley.....	Schuylerville
Walter Kimmin	Greenwich
Joseph M. Kulakowski.....	Amsterdam
Stephen P. Lalor.....	Watervliet
Edward F. Leahy.....	Ballston Spa
Thomas Le Grys.....	Cambridge
William Lithgow (spec.).....	Albany
William Mannion	Waterford
Frank R. McDermott.....	Albany
Harry S. Metcalf.....	Elizabethtown
Darwin E. Mott.....	Cobleskill
George V. Nellis.....	Fonda
James C. Norton.....	Bristol
George G. O'Connell.....	Moira
Edward O'Neil	Troy
Frank B. O'Neil.....	Troy
John H. Palmer.....	Marlboro
Floyd J. Reagan.....	Norfolk
George E. Robinson.....	Troy
Charles L. Rozon.....	Morris
Florence Ryan	Newport
Walter L. Ryan.....	Rensselaer
Harold J. Shafer.....	Fulton
Elmer J. Scheimer.....	St. Johnsville
Fred G. Schramm.....	Kingston
Arthur E. Seitzinger.....	Hudson Falls
Harold M. Seitzinger.....	Hudson Falls
Harold J. Smith.....	Warwick
Kenneth W. Swain.....	North Creek
Arthur H. Towne.....	Bloomingtondale
Bernard E. Tracey.....	Ilion
Herbert S. Underwood.....	Ilion
Harry J. Van Kleek.....	Hudson

John B. Vernay.....	Albany
Albert D. Warner.....	Albany
Ray S. Wallace.....	Norwich
Floyd B. Whitaker.....	Hudson
Brooks F. Wood.....	Salisbury Center
John A. Ziernack.....	Amsterdam
Juniors—67.	

Summary of Students, College of Pharmacy

Seniors.	45
Juniors.	67
Total	112

SUMMARY OF STUDENTS, UNION UNIVERSITY

Union College	402
Albany Medical College	257
Albany Law School	177
Albany College of Pharmacy	112
Total.	948

INDEX

	PAGE
Absences.....	129, 130
Admission	
Union College	
Academic Courses.....	30-41
Engineering Courses.....	30, 109, 120
Medical College.....	171
Law School.....	176
College of Pharmacy	181
Dudley Observatory.....	177
Apparatus and instruments.....	104
Awards at Commencement, June 1913.....	153
Calendar	
University.....	8
Union College.....	20
Medical College.....	163
Law School.....	175
College of Pharmacy.....	180
Certificates.....	30
Chapel.....	129
Civil Engineering.....	88, 95
Collections.....	73, 104
Committees	
of Trustees.....	23
of Faculty.....	26
Conditions.....	130
(See also Standing)	
Courses of Study.....	28
(See also Curriculum)	
Alternate Courses in Engineering.....	95
Change of Course.....	129
Curriculum	
Union College.....	75-78, 121-128
Medical College.....	164-166
Law School.....	176
College of Pharmacy.....	181

Degrees and Honors	PAGE
Union College	146
Medical College	171
Law School	176
College of Pharmacy	181
Degrees Conferred in 1913—Union College	150
Departments of Instruction	42
Electrical Engineering	110
Employment	134
Engineering School	83
Examinations	
Entrance (See Admissions)	
General	129, 130
(See also Standing and Conditions)	
Excuses (See Absences)	
Expenses	
Union College	132
Medical College	170
Law School	176
College of Pharmacy	181
Faculty	
University	10
Union College	24
Engineering	85
Medical	158
Law	174
Observatory	178
Pharmacy	179
Fees (See Expenses)	
General Engineering	95
Grades (See Standing)	
Graduation	
Union College	146
Medical College	171
Law School	176
College of Pharmacy	181
Graduate Courses	146, 88, 109, 119
Historical Statements	
University	7

Historical Statement— <i>Continued</i>	PAGE
Union College.....	19
Engineering School.....	83
Medical College.....	156
Law School.....	173
College of Pharmacy.....	178
Honors (See Degrees and Honors)	
Commencement.....	148
Special.....	148
(See also Awards in 1913 and Departments of Study)	
Lectures and Lecture Courses	72, 116
Library	72
Laboratories.....	103, 116, 63, 66, 68
Museum.....	73
Officers	
University.....	9
Union College.....	27
Medical College.....	157
Law School.....	174
College of Pharmacy.....	179
Dudley Observatory.....	178
Physical Education.....	70
Prizes.....	141
Promotion (See Requirements)	
Registration	
For Entrance Examinations.....	30, 40
For Conditions Examinations.....	131
For Non-Resident Work toward post-graduate degrees .	146
For Special Honors.....	148
Regulations (General).....	129-134
Reports.....	129
Requirements	
For Entrance (See Admissions)	
For Promotion (See Standing)	
For Graduation (See Graduation)	
For Graduate Degree (See Graduate Courses)	
Rooms.....	133
Sanitary Engineering.....	108

	PAGE
Scholarships.....	135
Standing, how graded, maintenance of.....	129
Irregular.....	131
Advanced.....	32
Students	
Union College.....	183
Medical College.....	196
Law School.....	204
College of Pharmacy.....	210
Summary for University.....	213
Studies, order of (See Curriculum)	
Subjects of Study	42, 88
(See also Departmental Curricula)	
Subjects required for Admission.....	31
Terms and Vacations.....	8, 21
(See also Department Calendars)	
Theses.....	95
Tuition (See Expenses)	
Trustees	
Union College.....	22
Medical College.....	157
Law School.....	174
College of Pharmacy.....	179
Dudley Observatory.....	178





[Handwritten signature]

UNIVERSITY OF ILLINOIS-URBANA



3 0112 112290207